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10/811,327	03/25/2004	Mark A. Hartenstein	2004MH01	1373

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EXAMINER	
CHANNAVAJJALA, SRIRAMA T	

ART UNIT	PAPER NUMBER
2166	

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/811,327	HARTENSTEIN ET AL.	
	Examiner	Art Unit	
	Srirama Channavajjala	2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/8/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 are presented for examination.

Drawings

2. The Drawings filed on 3/25/2004 are acceptable for examination purpose, however, formal drawings are required in response to this office action.

Information Disclosure Statement

3. The information disclosure statement filed on 9/8/2004 [3-pages] is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy is enclosed with this Office Action.

Priority

4. Acknowledgment is made of applicant's claim for domestic priority based on provisional application No. ***60/437,839***, filed on 03/25/2003 under 35 U.S.C. 119(e).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. At page 59, claim 5, line 18-19, "a first control; and a second control" is not described in the specification. Upon reviewing the specification, examiner found that there is no support for "a first control; and a second control"

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. At page 59, claim 5, line 18-19, it is not clear what is meant by "a first control; and a second control" for compact prosecution, examiner assumes first control and second control Is related to list of operations or selection of collaboration services operable to permit initiation of collaboration session, a contact display that presents to

selection of one or more contacts for the collaboration session in the office action and treated .

No new matter should be entered

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. ***Claims 1-20 are rejected under 35 U.S.C. 101 because invention is directed to non-statutory subject matter.***

As set forth in MPEP 2106(II)A:

Identify and understand Any Practical Application Asserted for the Invention The claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." State Street, 149 F.3d at 1373, 47USPQ2d at 1601-02. The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research (Brenner v. Manson, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96); In re Ziegler, 992, F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993)). Accordingly, a complete disclosure should contain some indication of the practical application for the claimed invention, i.e., why the applicant believes the claimed invention is useful.

Apart from the utility requirement of 35 U.S.C. 101, usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. See Arrhythmia, 958 F.2d at 1057, 22 USPQ2d at 1036. Merely claiming nonfunctional descriptive material stored in a ***computer-readable medium does not make the invention eligible for patenting****. For example, a claim directed to a word processing file stored on a disk may satisfy the utility requirement of 35 U.S.C. 101 since the information stored may have some "real world" value. However, the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement.* ***The claimed invention as a whole must produce a "useful, concrete and tangible" result to have a practical application****.*

10. Regarding Claim 1, 'a method for affiliation management, the method comprising: a step for providing a store comprising:

a first plurality of records each describing a respective person;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and indicia of a plurality of identified affiliations;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records;

a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;

a step for providing a control in the first user session;

a step for creating a second identified affiliation in response to operation of the control; and a step for providing a second presentation in accordance with the second identified affiliation in a second user session identified to a second person" is directed to "abstract idea" because all of the elements in the claim 1 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 18-21,page 44-45, page 46-47, page 49-50, page 52-53, as software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 1*** do not have "practical application" because the "final result" by the claimed invention in the claim 1 elements particularly "***a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;***

a step for providing a control in the first user session;

a step for creating a second identified affiliation in response to operation of the control; and a step for providing a second presentation in accordance with the second identified affiliation in a second user session identified to a second person" is merely software routines or steps related to data structure, but do not produce "useful, tangible and concrete" result, therefore, claim 1 is a non-statutory

subject matter. The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se.*

The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.").

[If] Claims 1 have the result of producing "real-world" results related to ***"a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the***

first plurality and the second plurality in accordance with a first identified affiliation;

a step for providing a control in the first user session;

a step for creating a second identified affiliation in response to operation of the control; and a step for providing a second presentation in accordance with the second identified affiliation in a second user session identified to a second person" however the claim[s] do not specify that the result either output , displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 7,0028, page 10-14, page 18-21,page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result ("***a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;***

a step for providing a control in the first user session;

a step for creating a second identified affiliation in response to operation of the control; and a step for providing a second presentation in accordance with the second identified affiliation in a second user session identified to a second person"). If the applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

Claims 2-4 depends from claim 1 is also rejected in the above analysis.

11. Regarding claim 5, "A method for affiliation management, the method comprising: a step for providing a store comprising:

a first plurality of records each describing a respective person;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment;

first indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks;

a third plurality of records each describing a charge of at least one of a time period and an expense;

second indicia of associations between records of the first plurality, records of the second plurality, and records of the third plurality; and third indicia of a plurality of identified affiliations;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records;

a step for providing in a first user session identified to a first person:

a first presentation comprising field values of records selected from the first plurality and the second plurality according to an identified affiliation;

a first control; and a second control;

a step for creating a record of the third plurality in response to user operation of the first control;

a step for receiving a request in response to user operation of the second control, the request comprising indicia of criteria; and

a step for downloading in a format for accounting a multiplicity of field values of records of the third plurality of records in accordance with the criteria" is directed to "abstract idea" because all of the elements in the claim 1 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 18-21,page 44-45, page 46-47, page 49-50, page 52-53, as software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 5*** do not have "practical application" because the "final result" by the claimed invention in the claim 5 elements particularly "***a first presentation comprising field values of records selected from the first plurality and the second plurality according to an identified affiliation;***

a first control; and a second control;

a step for creating a record of the third plurality in response to user operation of the first control;

a step for receiving a request in response to user operation of the second control, the request comprising indicia of criteria; and

a step for downloading in a format for accounting a multiplicity of field values of records of the third plurality of records in accordance with the criteria" is merely software routines or steps related to data structure, but do not produce "useful, and concrete" result, therefore, claim 5 is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.").

[If] Claims 5 have the result of producing "real-world" results related to "***a first presentation comprising field values of records selected from the first plurality and the second plurality according to an identified affiliation;***

a first control; and a second control;

a step for creating a record of the third plurality in response to user operation of the first control;

a step for receiving a request in response to user operation of the second control, the request comprising indicia of criteria; and

a step for downloading in a format for accounting a multiplicity of field values of records of the third plurality of records in accordance with the criteria" however the claim[s] do not specify that the result either output , displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 7,0028, page 10-14, page 18-21,page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result ("***a first presentation comprising field values of records selected from the first plurality and the second plurality according to an identified affiliation;***

a first control; and a second control;

a step for creating a record of the third plurality in response to user operation of the first control;

a step for receiving a request in response to user operation of the second control, the request comprising indicia of criteria; and

a step for downloading in a format for accounting a multiplicity of field values of records of the third plurality of records in accordance with the criteria"). If the

applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

12. Regarding claim 6, "A method for affiliation management, the method comprising: a step for providing a store comprising:

a first plurality of records each describing a respective person;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and indicia of a plurality of identified affiliations;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records;

a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising a first multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation; and

a step for providing a second presentation in a second user session identified to a second person, the second presentation comprising a second multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a second identified affiliation; wherein the second multiplicity includes at least one field value of the first multiplicity and at least one field value not of the first multiplicity"

is directed to "abstract idea" because all of the elements in the claim 6 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 18-21,page 44-45, page 46-47, page 49-50, page 52-53, as software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 6*** do not have "practical application" because the "final result" by the claimed invention in the claim 6 elements particularly ***"a step for providing a second presentation in a second user session identified to a second person, the second presentation comprising a second multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a second identified affiliation; wherein the second multiplicity includes at least one field value of the first multiplicity and at least one field value not of the first multiplicity"*** is merely software routines or steps related to data structure, but do not produce "useful, and concrete" result, therefore, claim 6 is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.").

[If] Claims 6 have the result of producing "real-world" results related to " ***a step for providing a second presentation in a second user session identified to a second person, the second presentation comprising a second multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a second identified affiliation; wherein the second multiplicity includes at least one field value of the first multiplicity and at least one field value not of the first multiplicity"*** however the claim[s] do not specify that the result either output , displayed or at least stored to a user or otherwise used in the real world. The examiner reviewed the specification page 7,0028, page 10-14, page 18-21, page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result (***a step for providing a second presentation in a second***

user session identified to a second person, the second presentation comprising a second multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a second identified affiliation; wherein the second multiplicity includes at least one field value of the first multiplicity and at least one field value not of the first multiplicity). If the applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

13. Regarding claim 7, "A method for affiliation management, the method comprising: a step for providing a store of identified affiliation information, the store comprising:

a first plurality of records each describing a respective person;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and indicia of a plurality of identified affiliations;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records;

a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;

a step for providing a control in the first user session for beginning a chat session; and

a step for providing a list of persons identified to other active user sessions selected from records of the first plurality in accordance with the criteria of the first identified affiliation" is directed to "abstract idea" because all of the elements in the claim 7 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 18-21,page 44-45, page 46-47, page 49-50, page 52-53, as software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 7*** do not have "practical application" because the "final result" by the claimed invention in the claim 7 elements particularly "***a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;***

a step for providing a control in the first user session for beginning a chat session; and

a step for providing a list of persons identified to other active user sessions selected from records of the first plurality in accordance with the criteria of the first identified affiliation" is merely software routines or steps related to data structure, but do not produce "useful, and concrete" result, therefore, claim 7 is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention

must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.").

[If] Claims 7 have the result of producing "real-world" results related to ***a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;***

a step for providing a control in the first user session for beginning a chat session; and

a step for providing a list of persons identified to other active user sessions selected from records of the first plurality in accordance with the criteria of the first identified affiliation, however the claim[s] do not specify that the result either output , displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 7,0028, page 10-14, page 18-21, page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result (to ***a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation;***

a step for providing a control in the first user session for beginning a chat session; and

a step for providing a list of persons identified to other active user sessions selected from records of the first plurality in accordance with the criteria of the first identified affiliation). If the applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

Claim 8 is depend from claim 7 is also rejected in the analysis of claim 7 above.

14. Regarding claim 9, "A store comprising: a first plurality of records each describing a respective person;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks;

a third plurality of records each describing a note;

indicia of associations between records of the third plurality and at least one of records the first plurality and records of the second plurality;

indicia of subject for associating records of the first plurality, the second plurality, and the third plurality, each respective association in accordance with a common subject; and indicia of affiliations, each affiliation being associated with a multiplicity of the first plurality, the second plurality, and the third plurality of records"
is directed to "abstract idea" because all of the elements in the claim 9 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 18-21,page 44-45, page 46-47, page 49-50, page 52-53, as software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 9*** do not have "practical application" because the "final result" by the claimed invention in the claim 9 elements particularly ***"indicia of associations between records of the third plurality and at least one of records the first plurality and records of the second plurality;***

indicia of subject for associating records of the first plurality, the second plurality, and the third plurality, each respective association in accordance with a common subject; and indicia of affiliations, each affiliation being associated with a multiplicity of the first plurality, the second plurality, and the third plurality of records" is merely software routines or steps related to data structure, but do not produce "useful, and concrete" result, therefore, claim 9 is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial

exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.").

[If] Claims 9 have the result of producing "real-world" results related to " ***indicia of associations between records of the third plurality and at least one of records the first plurality and records of the second plurality;***

indicia of subject for associating records of the first plurality, the second plurality, and the third plurality, each respective association in accordance with a common subject; and indicia of affiliations, each affiliation being associated with a multiplicity of the first plurality, the second plurality, and the third plurality of records", however the claim[s] do not specify that the result either output , displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 7,0028, page 10-14, page 18-21, page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result (***indicia of associations between records of the third plurality and at least one of records the first plurality and records of the second plurality;***

indicia of subject for associating records of the first plurality, the second plurality, and the third plurality, each respective association in accordance with a common subject; and indicia of affiliations, each affiliation being associated with

a multiplicity of the first plurality, the second plurality, and the third plurality of records"). If the applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

15. Regarding claim 13, "A method for affiliation management, the method comprising: a step for providing a store comprising: a first plurality of records each describing a respective person;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and indicia of a plurality of identified affiliations;

a step for providing a first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation and a first aggregation;

a step for receiving a request to edit a field value of a record of the store thereby creating a modified field value; and a step for providing a control comprising a list of alternate aggregations for user activation in place of the first aggregation, the list including a particular aggregation operative in accordance with the modified field value" is directed to "abstract idea" because all of the elements in the claim 13 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 17-21,page 44-45, page 46-47, page 49-50, page 52-53, as

software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 13*** do not have "practical application" because the "final result" by the claimed invention in the claim 13 elements particularly ***"a step for receiving a request to edit a field value of a record of the store thereby creating a modified field value; and a step for providing a control comprising a list of alternate aggregations for user activation in place of the first aggregation, the list including a particular aggregation operative in accordance with the modified field value""*** is merely software routines or steps related to manipulating data structure, but do not produce "useful, and concrete" result, therefore, claim 13 is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.").

[If] Claims 13 have the result of producing "real-world" results related to "***a step for receiving a request to edit a field value of a record of the store thereby creating a modified field value; and a step for providing a control comprising a list of alternate aggregations for user activation in place of the first aggregation, the list including a particular aggregation operative in accordance with the modified field value***", however the claim[s] do not specify that the result either output , displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 7,0028, page 10-14, page 17-21, page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result (***a step for receiving a request to edit a field value of a record of the store thereby creating a modified field value; and a step for providing a control comprising a list of alternate aggregations for user activation in place of the first aggregation, the list including a particular aggregation operative in accordance with the modified field value"***). If the applicant is able to

find one and inserts it into the claims provide the location the element is found in the specification.

16. Regarding claim 18, "A method for communicating among users of a plurality of users, the method performed by a server, the method comprising:

providing a list of items to any particular user of the plurality, wherein: each item is of a common type, the common type being of a set of types including a contact, an appointment, and a task; and each item is associated with a respective set of controls, wherein:

each respective set of controls comprises respective controls of common appearance as respective controls of each other set of controls; and each respective control of each set, when activated by a user, performs a function in accordance with the item to which it is associated; and

accepting input of the particular user to activate a particular control to facilitate at least one of the creation of a new item,

accessing a created item, and accessing a second list of created items, the second list prepared according to the method" is directed to "abstract idea" because all of the elements in the claim 18 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 7,0028, page 10-14,page 17-21,page 44-45, page 46-47, page 49-50, page 52-53, as software, such that the method is software, per se , is "non-statutory subject matter" and ***claim 18*** do not have "practical application" because the "final result" by the claimed invention in the claim 18 elements particularly

"***accessing a created item, and accessing a second list of created items, the second list prepared according to the method"*** is merely software routines or steps related to manipulating data structure, but do not produce "useful, and concrete" result, therefore, claim 18 is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***"useful, concrete result."*** In other words 'the claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material *per se*.

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[If] Claims 18 have the result of producing "real-world" results related to "***accessing a created item, and accessing a second list of created items, the second list prepared according to the method***", however the claim[s] do not specify that the result either output, displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 7,0028, page 10-14, page 17-21, page 44-45, page 46-47, page 49-50, page 52-53 but was unable to find a practical real-world use of the result (***accessing a created item, and accessing a second list of created items, the second list prepared according to the method***"). If the applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

17. Claims 1,5-7,13 preamble merely directed to ""A method for affiliation management", claim 9 is simply directed to "A store comprising: but fail to include a ***general description in the preamble***"

Claim 20, preamble reads " A memory device comprising instructions for performing the method of claim 18

Remarks:

Examiner suggests that the applicant consider amending claims 1,5-7,9,13,20 preamble to include general description. See MPEP 608.01 Claims: any claim should

contain the following order: (a) a preamble comprising a general description of all the elements of steps of the claimed combination which are convention or known.....

Examiner also suggests claim 20 should read " A computer-readable ***storage*** medium....., if specification sufficiently disclosed..

For "General Analysis for Determining Patent-Eligible Subject Matter", see 101 Interim Guidelines as indicated below:

<<http://www.uspto.gov/web/offices/pac/dapp/ogsheet.html>>

No new matter to be added.

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

19. Claims 1-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Behnia US Publication No. 2003/0088536 filed on April 9, 2001 and published on May 8, 2003

20. As to claim 1, Behnia teaches a system which including ' a method for affiliation management [page 5, col 2, 0098], affiliation management corresponds to plurality of

departments within an organization, the method comprising: a step for providing a store comprising:

a first plurality of records each describing a respective person' [page 7, col 1, 0113-0114, 0117], plurality of records corresponds to list of entities related to specific username, password and session ID as detailed in 0113-0114, 0117;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment' [page 13, col 2, 0226, 0228, fig 11, fig 13A], second plurality of records corresponds to task and appointment as detailed in fig 11, 13A;;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and indicia of a plurality of identified affiliations' [fig 7, page 13, col 2, 0230], Behnia specifically suggests user is linked to a specific project tab linking project, and root application category that is associated with the calendar items;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records [page 5, col 2, 0099, line 8-10, page 7, 0113-0115] Behnia specifically teaches user session ID association with username as detailed in page 7, 0113-0115;;

a step for providing a first presentation in a first user session identified to a first person, the first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation' [page 14, col 1, 0235];

a step for providing a control in the first user session [page 14, col 1, 0236]; a step for creating a second identified affiliation in response to operation of the control; and a step for providing a second presentation in accordance with the second identified affiliation in a second user session identified to a second person' [page 14, col 2, 0241], Behnia specifically suggests user associated with the specific project including records listed providing to the second user.

21. As to claim 2-4, Behnia disclosed 'a step for managing usage rights for each session' [page 7, col 1, 0116]; and a step for granting a usage right to the second person for creating during the second session an association of the second identified affiliation to a multiplicity of the first plurality of records not used in providing the first presentation' [page 6, col 1, 0102].

22. Claim 5,7-20 are rejected under 35 U.S.C. 102(e) as being anticipated by **Bjoernsen et al [hereafter Bjoernsen],** US *Publication No. 2004/0174392 filed on March 3, 2003 and published on Sept 9,2004.*

23. As to claim 5, A method for affiliation management [page 1, col 1, 0005], affiliation management corresponds to collaboration servers having collaboration sessions;

'a first plurality of records each describing a respective person' [page 6, col 2, 0068,], Bjoernsen specifically teaches various records related to the user's collaboration session;

'a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment' [fig 9, page 6, col 2, 0069], Bjoernsen specifically teaches calendar particularly suggests task and appointments;

first indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments [fig 10, element 244] and assignees to tasks [see fig 10, page 6, col 2, 0070];

'a third plurality of records each describing a charge of at least one of a time period and an expense' [fig 9, session history, element 230, page 4, col 2, 0049, line 8-12];

second indicia of associations between records of the first plurality, records of the second plurality [fig 12, element 258], and records of the third plurality; and third indicia of a plurality of identified affiliations' [fig 12, element 262,246], page 8, col 1, 0084];

a step for managing user sessions, each user session identified to a respective person of the first plurality of records' [page 5, col 2, 0059, line 8-10], Bjoernsen specifically suggests user session information is stored in the repository, fig 4, element 140 particularly session participant or user along with identifier and time stamp as detailed in page 5, col 2, 0059]; ;

a step for providing in a first user session identified to a first person [page 5, col 2, 0059]:

a first presentation comprising field values of records selected from the first plurality and the second plurality according to an identified affiliation [page 5, col 2, 0059, line 3-10, 0060, line 4-8]

a first control; and a second control [page 1, col 2, 0010];

a step for creating a record of the third plurality in response to user operation of the first control [page 4, col 2, 0049, line 12-18], Bjoernsen specifically suggests various records for example session start, end dates, times, session subject, session invitation text, session host, participants and like that including documents as detailed in page 4, 0049, line 12-18;;

a step for receiving a request in response to user operation of the second control, the request comprising indicia of criteria' [page 4, col 2, 0052, line 1-7]

'a step for downloading in a format for accounting a multiplicity of field values of records of the third plurality of records in accordance with the criteria' [page 8, col 2, 0087, line 9-18]

24. As to claim 7, 9, Bjoernsen teaches a system which including 'a method for affiliation management [page 1, col 1, 0005], affiliation management corresponds to collaboration servers having collaboration sessions;

a first plurality of records each describing a respective person [page 6, col 2, 0068,], Bjoernsen specifically teaches various records related to the user's collaboration session;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment [fig 9, page 6, col 2, 0069], Bjoernsen specifically teaches calendar particularly suggests task and appointments;;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks [fig 10, element 244] and assignees to tasks [see fig 10, page 6, col 2, 0070];

indicia of a plurality of identified affiliations [fig 12, element 262,246], page 8, col 1, 0084];;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records [page 5, col 2, 0059, line 8-10], Bjoernsen

specifically suggests user session information is stored in the repository, fig 4, element 140 particularly session participant or user along with identifier and time stamp as detailed in page 5, col 2, 0059];

a step for providing a first presentation in a first user session identified to a first person, [page 5, col 2, 0059]: 'the first presentation comprising a field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation [page 5, col 2, 0060, line 4-8];

'a step for providing a control in the first user session for beginning a chat session' [page 9, col 1, line 10-13, fig 13], Bjoernsen specifically suggests chat session as detailed in fig 13;; 'a step for providing a list of persons identified to other active user sessions selected from records of the first plurality in accordance with the criteria of the first identified affiliation' [page 9, col 1, 0093, fig 13-14].

25. As to claim 8, Bjoernsen disclosed 'indicia of a project identified to a first multiplicity of records of the first plurality and to a second multiplicity of records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and the list is further selected in accordance with indicia of the project' [fig 9-10, page 6, col 2, 0070].

26. As to claim 10, Bjoernsen disclosed 'common subject comprises indicia of a person of the first plurality of records' [fig 10]

27. As to claim 11, Bjoernsen disclosed 'common subject comprises a indicia of an item of the second plurality of records' [page 3, col 1, 0036]

28. As to claim 12, Bjoernsen disclosed 'indicia of a project identified to a first multiplicity of records of the first plurality and to a second multiplicity of records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and the common subject comprises indicia of the project' [fig 9-10, page 6, col 2, 0070].

29. As to claim 13, Bjoernsen teaches a system which including 'a method for affiliation management [page 1, col 1, 0005], affiliation management corresponds to collaboration servers having collaboration sessions

[page 6, col 2, 0068,], Bjoernsen specifically teaches various records related to the user's collaboration session;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment [fig 9, page 6, col 2, 0069], Bjoernsen specifically teaches calendar particularly suggests task and appointments;;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks [fig 10, element 244] and assignees to tasks [see fig 10, page 6, col 2, 0070]; indicia of a plurality of identified affiliations [fig 12, element 262,246], page 8, col 1, 0084];;

a step for providing a first presentation comprising field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation [page 5, col 2, 0059, line 3-10, 0060, line 4-8]; and a first aggregation [page 6, col 1, 0062];

a step for receiving a request to edit a field value of a record of the store thereby creating a modified field value' [page 5, col 1, 0055, line 9-11], Bjoernsen suggests editing meeting record[s] as detailed in page 5, 0055;

a step for providing a control comprising a list of alternate aggregations for user activation in place of the first aggregation, the list including a particular aggregation operative in accordance with the modified field value' [page 5, col 1, 0055, line 11-16].

30. As to claim 14, Bjoernsen disclosed 'a step for creating the particular aggregation' [page 5, col 1, 0056, line 1-4].

31. As to claim 15-16, Bjoernsen disclosed ' modified field value comprises indicia of a person of the first plurality of records' [page 8, col 2, 0088, line 12-16].

32. As to claim 17, Bjoernsen disclosed 'ndicia of a project identified to a first multiplicity of records of the first plurality and to a second multiplicity of records of the second plurality to associate at least one of attendees to appointments and assignees to tasks; and the modified field value comprises indicia of the project' [fig 9-10, page 6, col 2, 0070].

33. As to claim 18, 20, Bjoernsen teaches a system which including 'a method for communicating among users of a plurality of users' [page 2, col 2, 0032, line 9-11, page 3, col 2, 0040, line 1-5, fig 1], Bjoernsen specifically teaches collaboration session with one or more users as detailed in 0032, fig 1; the method performed by a server' [page 10, col 1, 0103], Bjoernsen specifically suggests client-server communication network;,

providing a list of items to any particular user of the plurality' [fig 9, page 6, col 2, 0069], Bjoernsen teaches scheduled collaboration calendar is presented to the user as shown in fig 9,

wherein: each item is of a common type, the common type being of a set of types including a contact, an appointment, and a task; and each item is associated with a respective set of controls' [fig 10, page 6, col 2, 0070, line 1-8], menu is displayed to the user with number of contacts for example as shown in fig 10, common type, the common type being a set of types including a contact corresponds to Bjoernsen's fig 10, contacts;,

wherein: each respective set of controls comprises respective controls of common appearance as respective controls of each other set of controls' [page 6, col 2,

0070, line 10-11], Bjoernsen specifically teaches contacts are shown as hyperlinks, common appearance corresponds to contacts are in hyperlinks;

'each respective control of each set, when activated by a user, performs a function in accordance with the item to which it is associated' [page 6, col 2, 0070, line 10-18, fig 10], Bjoernsen suggests user selects contact displayed by opening an empty e-mail addressed to the contact as detailed in page 6, 0070, fig 10;

accepting input of the particular user to activate a particular control to facilitate at least one of the creation of a new item, accessing a created item, and accessing a second list of created items, the second list prepared according to the method' [page 7, col 1, 0072], Bjoernsen suggests user selects or selecting check box so that user can select required contacts and that causes the session to launch automatically with selected contacts as detailed in page 7, col 1, 0072.

34. As to claim 19, Bjoernsen disclosed 'wherein the control comprises an icon having a multiplicity of appearances, each appearance conveying a status of a second item accessible via activation of the icon' [page 7, col 1, 0073].

Claim Rejections - 35 USC § 103

35. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

36. ***Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bjoernsen et al [hereafter Bjoernsen], US Publication No. 2004/0174392 filed on March 3, 2003 and published on Sept 9,200 in view of Lu, US Patent No. 7039596, filed on Oct 30,2002.***

37. As to claim 6, Bjoernsen teaches a system which including 'a method for affiliation management [page 1, col 1, 0005], affiliation management corresponds to collaboration servers having collaboration sessions;

a first plurality of records each describing a respective person [page 6, col 2, 0068,], Bjoernsen specifically teaches various records related to the user's collaboration session;

a second plurality of records wherein each record of the second plurality describes a respective item comprising at least one of a task and an appointment

[fig 9, page 6, col 2, 0069], Bjoernsen specifically teaches calendar particularly suggests task and appointments;;

indicia of associations between records of the first plurality and records of the second plurality to associate at least one of attendees to appointments and assignees to tasks [fig 10, element 244] and assignees to tasks [see fig 10, page 6, col 2, 0070];

indicia of a plurality of identified affiliations [fig 12, element 262,246], page 8, col 1, 0084];;

a step for managing user sessions, each user session identified to a respective person of the first plurality of records [page 5, col 2, 0059, line 8-10], Bjoernsen specifically suggests user session information is stored in the repository, fig 4, element 140 particularly session participant or user along with identifier and time stamp as detailed in page 5, col 2, 0059];

a step for providing a first presentation in a first user session identified to a first person, [page 5, col 2, 0059]:

'the first presentation comprising a first multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a first identified affiliation [page 5, col 2, 0060, line 4-8];

'a step for providing a second presentation in a second user session identified to a second person, the second presentation comprising a second multiplicity of field values of records selected from the first plurality and the second plurality in accordance with a second identified affiliation[page 4, col 2, 0051]. It is however, noted that Bjoernsen does not specifically teach 'wherein the second multiplicity includes at least one field value of the first multiplicity and at least one field value not of the first multiplicity. On the other hand, Lu disclosed 'wherein the second multiplicity includes at least one field value of the first multiplicity and at least one field value not of the first multiplicity [col 8, line 56-67, col 9, line 1-4, fig 4], Lu suggests multiple calendars refers to specific programs having field information different from other calendar field.

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate the teachings of Lu into collaboration launchpad of Bjoernsen et al. because both Bjoernsen, Lu specifically teaches calendar, contacts, events, schedules and appointments [see Bjoernsen: fig 9; Lu: fig 4], both Bjoernsen, Lu suggests sharing calendar events, appointments with other users [Lu: col 9, line 38-44; Bjoernsen: page 3, col 2, 0040] and both are from same field of endeavor.

one of the ordinary skill in the art at the time of applicant's invention to incorporate the teachings of Lu into collaboration launchpad of Bjoernsen et al. because that would have allowed users of Bjoernsen to create and view multiple electronic calendars side-by-side, furthermore allows to import events information from second electronic calendar into the first electronic calendar while maintaining event information

[see Lu: col 3, line 42-50], also allows to updating the combined view to reflect a change to at least one of the existing entries [see Lu: col 3, line 66-67, col 4, line 1-3], thus improving the quality and reliability of electronic calendar.

Conclusion

The prior art made of record

a.	US Pub.No. .	2003/0088563
b.	US Ppub. .No.	20040174392
c.	US Patent No.	7039596

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Srirama Channavajjala whose telephone number is 571-272-4108. The examiner can normally be reached on Monday-Friday from 8:00 AM to 5:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alam, Hosain, T, can be reached on (571) 272-3978. The fax phone numbers for the organization where the application or proceeding is assigned is 571-273-8300 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)

sc
Patent Examiner.
September 26, 2006.

SRIRAMA CHANNAVAJJALA
PRIMARY EXAMINER

Form PTO-1449 U.S. DEPARTMENT OF COMMERCE (REV. 8-83) PATENT AND TRADEMARK OFFICE **INFORMATION DISCLOSURE CITATION** (Use several sheets if necessary)	ATTY. DOCKET NO. 2004MH01	APPLICATION NO. 10/811,327
	APPLICANT HARTENSTEIN, et al	
	FILING DATE MARCH 25, 2004	GROUP 2171
	TITLE SYSTEMS AND METHODS FOR MANAGING AFFILIATIONS	

U. S. PATENT DOCUMENTS

EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
SC		5,557,746	9/17/96	CHEN	709	202	
SC		5,960,406	9/28/99	RASANSKY	705	9	
SC		5,991,742	11/23/99	TRAN	705	32	
SC		6,064,977	5/16/00	HAVERSTOCK	705	9	
SC		6,380,959	4/30/02	WANG	715	853	
SC		6,480,830	11/12/02	FORD	705	9	

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

SC		CHANDY K. MANI, "A WORLD-WIDE DISTRIBUTED SYSTEM USING JAVA AND THE INTERNET", MARCH 8, 1996, pp. 1-10
SC		"TRASH YOUR DESKTOP", FITZGERALD, ~~NOVEMBER 2003~~, MIT TECHNOLOGY REVIEW, OCTOBER 20 2003, http://www.metr.net/print_8477.html

EXAMINER /Srirama Channavajjala/ DATE CONSIDERED (09/25/2006)

*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
SC		2001/0014866 A1	8/16/01	CONMY	705	9	
SC		2001/0014867 A1	8/16/01	CONMY	705	9	
SC		2002/0023132 A1	2/21/02	TORNABENE	709	205	
SC		2002/0032588 A1	3/14/02	GLAZER	705	6	
SC		2002/0035728 A1	3/21/02	FRIES	728	68	
SC		2002/0042838 A1	4/11/02	TABAYOYON	709	237	
SC		2002/0147661 A1	10/10/02	HATAKAMA	705	26	

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER /Srirama Channavajjala/ DATE CONSIDERED (09/25/2006)

*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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U. S. PATENT DOCUMENTS

EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
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SC		5,999,938		BLISS	707	102	

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*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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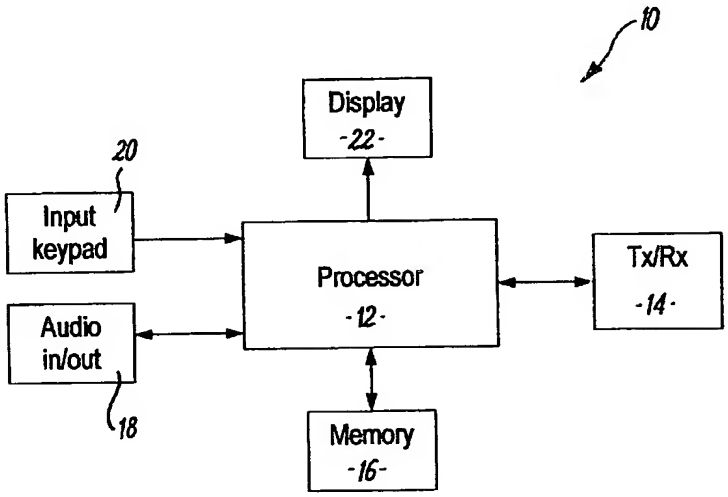
(54) Title: INSTANT MESSAGING AND PRESENCE SERVICES



(57) Abstract: A mobile telephone terminal provides a user with a selectable option to transfer a telephone call to an instant messaging session and to transfer an instant messaging session to a telephone call. A presence attribute indicator for a first party is displayed, in a mobile telephone application, with an entry associated with the telephone number of the first party. A user, while displaying an entry for a party in a mobile telephone application, has a selectable option for initiating instant messaging with the party. The mobile telephone provides a customised menu of selectable options for initiating communication. The menu is dependent upon received presence attribute information. A calendar application can store the content of an instant messaging dialaogue in an appointment record. When an application accesses a stored telephone number of a party the stored instant messaging address of that party is automatically accessed or accessible and when the application accesses a stored instant messaging address of a party, the storedtelephone number of that party is automatically accessed or accessible.

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Instant Messaging and Presence Services

Embodiments of the present invention relate to the integration of instant messaging functionality with the existing functionality of mobile telephones.

The Wireless Village (www.wireless-village.org) is an initiative for Instant Messaging and Presence Services (IMPS) backed by a number of leading mobile telephone manufacturers. The Wireless Village has published a specification for IMPS.

The specification describes how an IMPS client communicates with a server to provide an Instant Messaging service and a Presence Attribute service. Instant messaging allows messages such as text, pictures or files to be sent between IMPS clients via the server. This allows two users to 'chat' interactively by exchanging messages instantly between their clients. Presence Attributes allow a user to publish attribute information about the user or their terminal, such as whether they are available for instant messaging, their preferred method of contact etc. Another IMPS client can obtain this attribute information and be informed of changes to the information.

The Wireless Village specifications are concerned with enabling IMPS which is a powerful new technology. They are not concerned with the how it will be integrated with existing technology.

It would be desirable to integrate mobile telephone functions and instant messaging and presence services.

According to a first aspect of the present invention there is provided a mobile telephone terminal arranged to provide a user with a selectable option during a telephone call with a first party, the selection of which initiates communication with the first party by instant messaging. There is also provided a method according to claim 13 and a system according to claim 14.

According to a second aspect of the present invention the is provided a mobile telephone terminal arranged to provide a user with a selectable option while instant messaging with a first party, the selection of which initiates a telephone call with the first party. There is also provided a method according to claim 27 and a system according to claim 28.

According to a third aspect of the present invention the is provided a mobile telephone terminal comprising at least one mobile telephone application, wherein the mobile telephone application is arranged to display to a user a presence attribute indicator for a first party with an entry associated with the telephone number of the first party. There is also provide a method according to claim 55, a method according to claim 56 and a system according to claim 57.

According to a fourth aspect of the present invention the is provided a mobile telephone terminal comprising at least one mobile telephone application, wherein the mobile telephone application is arranged to display an entry associated with a first party and to provide to a user, while displaying the entry, a selectable option for initiating instant messaging with the first party. There is also provided a method according to claim 77.

According to a fifth aspect of the present invention the is provided a mobile telephone terminal arranged to display an entry associated with a first party and provide a customised menu of selectable options for initiating communication with the first party, wherein the selectable options displayed are dependent upon received presence attribute information for the first party. There is also provided a method according to claim 96.

According to a sixth aspect of the present invention there is provided a terminal comprising: an instant messaging client for participating in an instant messaging dialogue with one or more parties; and a calendar application, for recording appointments, arranged to store the content of an instant messaging dialogue in an appointment record. There is also provided a method according to claim 109.

According to a sixth aspect of the present invention the is provided a terminal comprising: at least one application from which a telephone call and instant messaging can be initiated, wherein when the application accesses a stored telephone number of a party the stored instant messaging address of that party is automatically accessed or accessible and when the application accesses a stored instant messaging address of a party, the stored telephone number of that party is automatically accessed or accessible.

For a better understanding of the embodiments of the present invention and to understand how the same may be brought into effect, reference will now be made, by way of example only, to the accompanying drawings in which:

Fig. 1 illustrates a mobile telephone terminal;

Fig. 2 illustrates one type of user interface for the mobile telephone terminal;

Fig. 3A and 3B illustrate a user interface during the transfer of a communication session from instant messaging to a telephone call;

Fig. 4 illustrates a user interface for a mobile telephone application (call register); and

Fig. 5 is a process flow-diagram for a Calendar application.

Fig. 1 illustrates a mobile telephone terminal 10 for communicating in a cellular radio telecommunications network. The mobile telephone terminal 10 comprises a processor 12, a cellular radio transceiver 14, a memory 16, audio input/output 18, an input keypad 20 and a display 22. The processor 12 receives input commands from the input keypad 20, controls the output of the display 22, receives audio input from and provides audio output to the audio input/output 18, is arranged to read from and write to the memory 16 and is arranged to communicate in the cellular radio telecommunications network using the cellular radio transceiver 14.

Fig. 2 illustrates a user interface of the mobile telephone terminal 10. The user interface includes a display 22 and an input keypad 20. The input keypad 20 has a first soft key button 42, a second soft key button 44, an up scroll key 46, a down scroll key 48 and a keypad array (not shown). The display 22 has a main central display portion 30, a first text display portion 32 adjacent the first soft key 42 and a second text display portion 34 adjacent the second soft key 44. The first text display portion 32 is used to display text indicating the function of the first soft key 42. The second display portion 34 is used to display text indicating the function of the second soft key 44. The text displayed in the first text display portion 32 and in the second text display portion 34 changes as the functions of the respective first and second soft keys change. Although, two soft keys are shown in this example, in other user interfaces a single soft key may be used.

The memory 16 stores software, which when loaded into the processor 12 controls the operation of the mobile telephone terminal 10. This software provides applications and a menu for entering the applications. The menu can be navigated using the input keypad 20. If multiple options are to be provided to a user at a particular point in the menu this can be provided via the soft keys or, if the options out-number the number of soft keys, as a list in the main display portion 30. An entry in the list can be chosen by highlighting the desired entry using the scroll keys 46, 48 and then selecting the entry using a soft key 42, 44.

The mobile telephone terminal 10 is capable of making and receiving telephone calls. It will also generally be capable of sending messages via the cellular telephone

communication network. For example, in 3GPP (GSM, GPRS, WCDMA) network the mobile telephone terminal 10 may be capable of sending alphanumeric SMS messages and/or multimedia MMS messages.

The mobile telephone terminal 10 is also an Instant Messaging Client (Wireless Village embedded client) that can connect to an instant messaging server using the cellular telecommunications network as a bearer for the IMPS.

An IMPS session is established when a client logs onto an instant messaging server and is terminated when the client logs out or is logged out. If two clients are to communicate by instant messaging, they must both have a session with the server.

Instant messages can be addresses using a User-ID which is a unique instant messaging address assigned to a user. The User-ID is syntactically equivalent to an e-mail address. It has the format *alphanumeric string or alphanumeric string* @ domain. A user may also be referred to by screen names, nicknames and aliases. Theses identifiers implicitly and explicitly refer to the User-ID.

Communication in IMPS occurs as a series of separate transactions. Each transaction consists of a request and a response between a client and a server.

An instant messaging client is able to originate and receive instant messages. To send an instant message from the client of the originator, the client initiates a Send Message Transaction. It sends a SendMessageRequest message to the server, which replies with the SendMessageResponse message. The SendMessageRequest message comprises the originator's User-ID, the recipient's User-ID and the instant message content. The server sends the instant message to the client of the recipient using a Message Delivery Transaction. The server sends the NewMessage message to the recipient client, which replies with the MessageDelivered message. The NewMessage message comprises the originator's User-ID, the recipient's User-ID and the instant message content.

An IMPS client may obtain presence information associated with a target user and/or the user's client terminal by initiating a Subscribed Presence Transaction or a Get Presence Transaction with the server. Only those attributes that are authorized for publication will be provided.

In the Subscribed Presence Transaction, the initiating client sends a SubscriberPresenceRequest message to the server and the server replies with a Status message. The SubscriberPresenceRequest message identifies the User-ID(s) of the target users(s) and the presence attributes for which notification is requested. The requesting client subsequently receives from the server the current presence information in a PresenceNotificationRequest message and will be informed of future changes to the subscribed presence attributes for the subscribed users as they happen. In order to stop continual updating of the presence information from the server it is necessary to unsubscribe at the server.

The Get Presence Transaction may be initiated at any time. The initiating client sends a GetPresenceRequest message to the server containing the target's User-ID and optionally a list of requested presence attributes. The server responds with a GetPresenceResponse message containing the result of the request and the presence attributes.

The presence attributes that can be made available include presence information about the client and presence information about the user. The information about the client (client status) may include 'online status' and 'registration'. 'Online Status' indicates whether a client has an active session i.e. is logged into an IMPS server and is therefore available for instant messaging. 'Registration' indicates whether a client device is registered in a mobile telecommunications network and should therefore be available for receiving a telephone call, SMS or MMS. The information about the user (user status) may include 'user availability', 'preferred contact' and 'contact info'. 'User Availability' indicates the availability of the user and the amount of acceptable distraction i.e. available, unavailable, selectively available. 'Preferred contact' indicates the preferred method of contact e.g. call, SMS, MMS, IM, email. A 'contact address' attribute may give the address for the preferred contact method e.g. phone number, MMS address, User-ID, email address. 'Contact Info' is a vCard (i.e. an electronic introduction card) for the user that can be sent as an MMS message.

The inventor has realized that the functionality of a mobile telephone terminal 10 and an IMPS client can be integrated more closely together, to provide an improved telecommunications terminal. Currently, the mobile telephone terminal has certain mobile telephone applications that relate to its functionality e.g. telephone calls and SMS/MMS messages and some applications that are used for organization such as a Calendar. An IMPS client in a mobile telephone has certain applications that relate to its functionality e.g.

obtaining information about presence attributes and instant messaging. Although currently the IMPS client can be integrated physically within a mobile telephone terminal, the functions associated with the mobile telephone and the functions associated with the IMPS client are provided as alternatives components in the menu structure. This is inconvenient as it means that a long navigation of the menu may be required to perform a function associated with the phone and then a function associated with the IMPS. The inventors have developed a simple and innovative mechanism that allows the functionality of the mobile telephone and IMPS client to be integrated.

The terminal (mobile telephone and IMPS) 10 is arranged so that when a mobile telephone application (e.g. telephone calling, SMS messaging) has access to a telephone number for a party it also has immediate access to the IMPS address (User-ID) for that party.

A database in memory 16 associates, for each contact party, the telephone number of the party and the User-ID for that party. The mobile telephone applications (e.g. telephone calling, SMS messaging, Call Register etc) are adapted so that when an application recalls a telephone number from the database for a party, it recalls automatically, or has the ability to recall automatically, the associated User-ID for that party (if in the database). The IMPS applications (e.g. obtaining presence attributes, instant messaging) may be adapted so that when an application recalls a User-ID from the database for a party, it recalls automatically, or has the ability to recall automatically, the associated telephone number for that party (if in the database).

In one embodiment, the database storing contact information for the user (e.g. the phonebook) is arranged so that the User-ID for a party and the telephone number for the party are treated as different fields in a single entity that is associated with the party and retrievable by an application.

In one implementation, a database entry would use a data field identifying a party (e.g. a name) and a pointer field for a default contact point, which would point to a default phone number and the User-ID. When an application queries the database for an entry both fields are returned. The application can then immediately recall one or both of the telephone number and User-ID from the database using the pointer field.

In another implementation, an entry in a phonebook for a party would use a data field for the name, a data field for a default telephone number and a data field for a User-

ID. When an application queries the database for a party, all the data fields for that party's entry are returned. The application can then immediately use one or other of the telephone number and the User-ID. Even though only one of the telephone number and User-ID are to be used, they are both stored in active memory so that the other is readily accessible should it be required.

The database used by the phonebook application has a data entry field for User-ID, that a user can fill in, when entering the phone number of a new party.

As a consequence of the close association of the User-ID and telephone number, an application that requires access to one of the phone number and User-ID for one mode of operation automatically has access to the other one for another mode of operation. The user only chooses whom to contact. The application, depending on the mode of operation, which may be user selected, chooses which of the phone number and User-ID will be used. The application may therefore easily switch from a communication mode using the phone number to another communication mode using the User-ID. Thus telephone modes, including telephone conversations and SMS messaging (i.e. modes using the telephone number), are interchangeable with IMPS modes, including instant messaging (a mode using the User-ID).

The functionally integrated mobile telephone terminal and IMPS client may provide any one or more of the following additional services:

1) The simple switching of a communication session between a telephone call and instant messaging.

2) The provision of presence attribute information in relation to telephone functions (e.g. in a phonebook, call register or SMS message register).

3) The initiation of instant messaging directly from a telephone function (e.g. a phonebook, call register or SMS message register).

4) The dynamic customization of a menu of communication options based on presence information.

5) The integration of instant messaging with other telephone functions (e.g. Calendar)

It is possible to continue a communication session between parties A and B by transferring the communication means from instant messaging between parties A and B to a telephone call between users A and B. In the situation in which party A and party B are engaged in instant messaging, one or other of A or B can transfer the instant messaging

session into a telephone call. It is of course preferable that the transfer process cannot be unilateral but must be by mutual consent.

Fig. 3A illustrates the user interface of a mobile telephone terminal 10 which is being used by a user A to communicate using instant messaging with a party B. The mobile terminal used by B may have a similar user interface. In the example of Fig. 3A, the first soft key 42 is activated by user A to access available options and the second soft key 44 is activated to end the interactive messaging session. When user A presses the first soft key 42, a number of different options are displayed on the main display portion 30. The user may scroll through these options using the up scroll key 46 and the down scroll key 48 and then select one of the options using one of the first or second soft keys 42, 44. One of the options is "call". Selecting this option causes the mobile telephone terminal 10 to call the party B to whom instant messages are being sent.

In another embodiment, while instant messaging, the first soft key 42 has the associated function of initiating a call and the associated text display portion 32 displays "Call". Activating the first soft key 42, while instant messaging, initiates a call to user B without having to enter an options menu.

Selecting the "call" option either directly or through the options menu, immediately and automatically initiates the process for making a telephone call as shown in Fig. 3B.

To initiate a telephone call between A and B, it is necessary for either A or B to have the telephone number of the other. In the situation where user A selects the call option during the interactive messaging session, his terminal will attempt to originate the telephone call.

In the situation in which A has initiated the instant messaging session from his phonebook and has therefore recalled B's telephone number as well as his user-ID from the database, A's terminal will have B's telephone number immediately available and can therefore automatically make the call.

If A's terminal does not have B's telephone number immediately available, it may try and find a stored version of the telephone number within the terminal. This may be achieved by searching the database of terminal A using the User-ID of user B to obtain the associated mobile telephone number. It may also be achieved by searching received presence attributes for user B stored in the terminal.

If the terminal is unable to find a telephone number for user B, it may attempt to obtain user B's telephone number by initiating a Get Presence Transaction by sending a GetPresenceRequest message to the instant messaging server containing user B's user-ID and the contact address attribute. The server may respond with the address for the preferred contact method by which to contact user B which may be his telephone number. User A's terminal processes the received presence information to determine whether or not a telephone number has been received and if it has, it is extracted and used to telephone user B.

As an alternative, or in addition to, requesting the present attributes, the terminal of user A may send a special call initiation instant message to user B. This special instant message, is not a message that is displayed on the display of the terminal of user B but is a control message that enables the terminal of user B to send user B's telephone number to the terminal of user A. The call initiation instant message results in an option being presented to the user B who may decline or accept it. If it is accepted, user B's telephone number is sent automatically to user A in the body of an instant message (or an SMS message). User A's terminal extracts the telephone number from the body of the instant message (or from the SMS) and uses it to call user B.

It should be appreciated that when a user is using the instant messaging functionality, it is a simple process for them to access the telephone call functionality. There is no need for them to navigate through the menu structure, as the ability to transfer the instant messaging session to a telephone conversation is readily available.

It is also possible to transfer a telephone call to an instant messaging session. In the situation in which A and B are engaged in a telephone conversation, one or other of A or B can transfer the telephone conversation into an instant messaging session. It is of course preferable that the transfer process cannot be unilateral but must be by mutual consent.

While a user is engaged in a telephone conversation, they may select "options" by depressing the first soft key 42. One of the options consequently displayed is "start IM". If the user selects this using the up and down scroll keys 46, 48, and a soft key his terminal will start the transfer process by which the telephone conversation is transferred to an instant messaging session. In an alternative user interface arrangement, while a user is

engaged in a telephone conversation, they may select "start IM" by depressing the first soft key 42.

It is assumed in the following that A and B are both logged onto an IMPS server i.e. that they are both in session. If one or both are not logged on, then they would have to log on before they can exchange instant messages. This can be done automatically without prompting for passwords.

In the situation in which user A has initiated the telephone call from his phonebook and therefore recalled the user-ID of party B as well as the telephone number of party B from the database to active memory, then the terminal of user A is simply able to send an instant message to B. This instant message will by default also include user A's user-ID and consequently both A and B will have all the necessary information to have an instant messaging chat session.

In the situation in which the user who is initiating the transfer from the telephone call into instant messaging, did not originate the telephone conversation, then the terminal may search a database associating telephone numbers and User-IDs, using the telephone number of user A obtained via call line identification (CLI). If the database has an entry for user A that contains both its telephone number and user-ID, the user-ID can be accessed and used to send an instant message to user A. This instant message will by default include the user-ID of user B and consequently both users' terminals will have the necessary information to have an instant messaging chat session.

In the situation in which the terminal which is initiating the transfer from a telephone conversation to an instant messaging chat session, e.g. the terminal of user A, does not have the user-ID of B, the terminal of user A can send an SMS to the terminal of party B that includes the user-ID of user A. The terminal of party B, when it receives this SMS, is able to extract the user-ID of user A and use this to start the instant messaging chat session. The user-ID of user A may be extracted from the SMS either by searching for an alphanumeric text string including "@" or it could be done with a settings or business card SMS message. It is of course also possible for the user who accepted the incoming call to initiate the transfer of the telephone conversation to an instant message chat session. This would be achieved by sending an SMS message to user A. This is possible because the telephone number of user A may be obtained using call line identification.

It should therefore be appreciated that if a user is involved in a telephone conversation, the user does not have to navigate through a complex menu to an IM section, choose to initiate an IM session and choose whom to talk to and then activate the process. Instead, the user can simply access the instant messaging functionality via the current mobile telephone application.

As the telephone number and user-ID are associated together, any application that primarily uses a telephone number can also use a feature of IMPS. Thus any mobile telephone application related to a telephone number such as the phonebook, the call register (missed calls, received calls, made calls etc.) and the SMS register (sent messages, received messages, etc.) can also give presence information for the user-ID associated with the relevant telephone number. The mobile telephone applications relate to sending and receiving using communication mechanisms specified for the mobile telecommunications network.

As shown in Fig. 4, the presence information can be given by a presence indicator 50 on the display 22. The presence indicator may be in the form of a small icon, an exclamation mark, a different colour scheme or other signifying symbol next to the relevant entry for a user. The presence indicator may give an indication of the "on-line status" presence attribute of a user so that it is immediately apparent whether the user is logged on and available for instant messaging. The presence indicator may be an indication of the "registration" presence attribute and therefore indicate whether a client device is registered in a mobile communications network and should therefore be available for receiving a telephone call, SMS or MMS. The presence indicator 50 may be an indication of the "user availability" presence attribute of the user and therefore indicate whether the user is available or unavailable. The presence indicator 50 may be an indication of the "preferred contact" presence attribute and therefore indicate the preferred method of contact e.g. telephone call, SMS, MMS, instant messaging etc.

The phonebook application displays multiple entries, each of which has an associated telephone number. A telephone call can be initiated from a displayed entry to the associated telephone number. All or selected ones of the phonebook entries display a presence attribute indicator 50.

The call register application displays any one of a set of multiple entries. There is a set of multiple entries for each of: missed calls; received calls; and calls made. Each entry has an associated telephone number. A telephone call can be initiated from a displayed

entry to the associated telephone number. All or selected ones of the entries display a presence attribute indicator 50.

A text message register application displays any one of a set of multiple entries. There is a set for each of received messages and sent messages. Each entry has an associated telephone number. A telephone call can be initiated from a displayed entry to the associated telephone number. All or selected ones of the entries display a presence attribute indicator 50.

The presence attributes for one or more entries can be automatically updated by subscribing, using a Subscribed Presence Transaction, to receive updated presence attribute information. The presence attributes can be selectively updated using a Get Presence Transaction. The received presence attributes are processed to determine the appropriate presence attribute indicator for an entry in a mobile telephone application.

In Fig. 4 a telephone call register is illustrated. It indicates that a call was missed from the party "Peter". The presence attribute indicator 50 may for example indicate that the client device of that party is registered in a mobile telecommunications network and/or that the preferred contact method is by telephone call and/or that the user is available. The user may therefore choose that a telephone call is the most appropriate way of contacting the user. By selecting the first soft key 42, the options menu is entered. The user may then use the input keypad 20 to select the option for initiating the telephone call to the user. Alternatively, the presence indicator 50 may alternatively or in addition indicate that the user is logged on to the IMPS server and/or the preferred method of contact is by instant messaging and/or that the user is available. The user may therefore decide that the appropriate method of contact is by instant messaging. The user may enter the options menu by selecting the soft key 42. The option of starting an instant messaging session with the user is then selected from the options menu using the input keypad 20.

Although the above example has been given with respect to the call register it should be appreciated that it is equally applicable to the SMS register and/or the phonebook. For example, each entry in a phonebook may have a presence indicator 50 adjacent it indicating whether the person should be contacted by instant messaging, telephone call or SMS.

In the above described examples, it may be necessary to obtain presence attribute information for a large number of parties e.g. the content of a phonebook. This may place a considerable demand on a terminal. It may not therefore be appropriate to obtain presence information for all of the entries e.g. in a phone book. It is desirable for the mobile terminal to have a user configurable option so that the user can determine which entries should have presence data information associated with them and what information should be obtained.

According to one embodiment of the present invention, the options menu itself is automatically adapted or customised by the terminal in dependence upon the presence information available with respect to a certain party. Thus, if the preferred contact method for the party is by instant messaging and not by telephone call, then when the communications options menu is entered for that party, the option of starting an instant messaging session is provided but the option of starting a telephone call is not. Likewise if the preferred method of contact is by telephone conversation, then when the communications options menu is entered for that party, there may be an option to start a telephone conversation but not an option to start an instant messaging session. As another example, if the mobile terminal is not registered in a telecommunication network or the user is not available, there may not be an option of having a telephone conversation or an instant messaging session but there may be the option of sending an SMS. The SMS would be stored in the network and would be pushed to the user when they next attach to the network. Thus the menu system of the mobile telephone terminal may be dynamic in that it changes in dependence upon the presence information received. This allows, in particular, menu options for communicating with a particular party to be automatically and dynamically customised. As an example, the options available from the phonebook may be dynamically varied in dependence upon the presence information received for a particular contact entry. Thus for an entry in a telephone book for one party, there is presented the options of contacting that party by telephone call, SMS or instant messaging whereas for an entry for another party there may only be presented the option of contacting that other party by instant messaging only.

It is also possible to integrate instant messaging into other functions of the mobile telephone terminal, such as the calendar application. The calendar application is adapted so that a reminder to participate in an instant messaging meeting can be entered into the calendar at a particular date. The reminder includes the user-ID of each of the intended participants of the instant messaging meeting. When the time and date for the meeting arrives, the mobile telephone terminal offers the user the opportunity to automatically

initiate the meeting via instant messaging. The dialogue that occurs during the meeting is displayed on the display 22 but is in addition stored in memory 16. At the end of the meeting, the user is given the option of storing the recorded dialogue of the interactive instant messaging meeting as a note associated with the entry for the meeting in the calendar. Thus, when the meeting entry in the calendar is opened in the future, it is possible to review the content of the instant messaging meeting.

This process of using the calendar is illustrated in more detail in Fig. 4. At step 100, the user enters the calendar application for recording an appointment. At step 102 the user selects a date. At step 104 the selects the appointment type as a meeting. At step 106 the user is prompted for and enters the text describing the purpose of the meeting. At step 108 the user is prompted for and enters the time of the meeting. At step 110, the user is prompted for and enters the names or aliases of the attendees. At step 112 the user is prompted to indicate what type of meeting it is for example whether or not it is an instant messaging meeting. If the meeting is to be an instant messaging meeting, then the calendar application at step 114 sends out an invitation to all attendees. This may be sent as an instant message, if possible, or as an SMS. The appointment record is then entered in the calendar at step 116 and the user exits the application.

When the date and time for the appointment comes around, an alert for the IM meeting goes off at step 120. At step 122, the terminal checks the presence information on the intended attendees for the meeting to determine whether or not they are available. It checks to discover the "on-line status" of the attendees. If the terminal does not have this information, it initiates a get presence transaction. It sends a GetPresenceRequest message to the server containing the user-IDs of the intended attendees and also identifies the on-line status presence attribute. At step 124, the appointment record is opened and the user is informed of which attendees are available for instant messaging. A presence attribute indicator may be displayed with each attendee. At step 126, the user is prompted to decide whether or not to initiate the IM meeting. If the IM meeting is initiated the process proceeds to step 128. At step 128, the mobile terminal initiates the IM session using the user-IDs of all the available attendees. If necessary, the terminal automatically logs on to the instant messaging server. At step 130 the IM session occurs and the dialogue is stored in the memory. At step 132 the IM session is terminated by the user. At step 134 the user is prompted whether or not they wish to save the stored dialogue in the appointment record. If the user chooses to save the stored dialogue, they are given an opportunity to edit the dialogue at step 136 and before it is imported into the appointment at step 138 and the appointment saved at step 140. The user then exits the application at

step 142. If the user decides not to initiate the IM session at step 126 or decides not to store the saved dialogue at step 134 the process jumps to step 142 and exits the application.

Although embodiments of the present invention have been described in the preceding paragraphs with reference to various examples, it should be appreciated that modifications to the examples given can be made without departing from the scope of the invention as claimed. For example embodiments of the present invention may find application in terminals other than mobile telephone terminals such as personal digital assistants, portable computers or computer terminals than have an embedded instant messaging client.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. A mobile telephone terminal arranged to provide a user with a selectable option during a telephone call with a first party, the selection of which initiates communication with the first party by instant messaging.

2. A mobile telephone as claimed in claim 1, wherein the terminal automatically initiates communication with the first party by instant messaging after user selection of the provided option without further user intervention.

3. A mobile telephone terminal as claimed in claim 1 or 2, wherein the user selectable option is one of many user selectable options that are provided as a menu during a telephone call at the instigation of the user.

4. A mobile telephone as claimed in claim 3 wherein the instigation involves a single key-stroke during the telephone call.

5. A mobile telephone as claimed in claim 1 or 2, wherein the user selectable option is selected by a single keystroke during the telephone call.

6. A mobile telephone terminal as claimed in any preceding claim arranged to automatically log on to an instant messaging server.

7. A mobile telephone terminal as claimed in any preceding claim, wherein if the terminal stores the first party's instant messaging address it initiates communication by sending an instant message to the first party.

8. A mobile telephone terminal as claimed in any preceding claim, wherein if the terminal does not store the first party's instant messaging address it initiates communication by sending the user's instant messaging address to the first party.

9. A mobile telephone terminal as claimed in any preceding claim arranged to obtain automatically an instant messaging address from a received text message.

10. A mobile telephone terminal as claimed in any preceding claim comprising a memory for storing a database in which the instant messaging address of the first party and a telephone number of the first party are associated together.

11. A mobile telephone terminal as claimed in claim 10 arranged to search the database for an instant messaging address using an associated telephone number.

12. A mobile telephone terminal as claimed in any preceding claim comprising:
option means for controlling a display to display a user selectable option or options;
selection means for enabling a user to select a displayed option;
an instant messaging client arranged to initiate instant messaging; and
control means responsive to the selection means when the selected option indicates the initiation of instant messaging to enable the instant messaging client.

13. A method of changing the mechanism by which a first party and a second party communicate during a communication session comprising the steps of:
communicating via a telephone call between the first and second parties; and
displaying a user selectable option during the telephone call to at least one of the parties, the selection of which initiates the establishment of instant messaging between the parties.

14. A system for providing communication between a first party and a second party using a telephone call and instant messaging, arranged to
switch a communication session between the parties from a telephone call to instant messaging.

15. A mobile telephone terminal arranged to provide a user with a selectable option while instant messaging with a first party, the selection of which initiates a telephone call with the first party.

16. A mobile telephone as claimed in claim 15, wherein the terminal automatically initiates a telephone call with the first party after user selection of the provided option without further user intervention.

17. A mobile telephone terminal as claimed in claim 15 or 16, wherein the user selectable option is one of many user selectable options that are provided as a menu, while instant messaging, at the instigation of the user.

18. A mobile telephone as claimed in claim 17 wherein the instigation involves a single key-stroke while instant messaging.

19. A mobile telephone as claimed in claim 15 or 16, wherein the user selectable option is selected by a single keystroke while instant messaging.

20. A mobile telephone terminal as claimed in any one of claims 15 to 19, wherein if the terminal stores the first party's telephone number it initiates communication by placing a telephone call to the first party.

21. A mobile telephone terminal as claimed in any one of claims 15 to 20, wherein if the terminal does not store the first party's telephone number it initiates communication by sending an instant message to the other party providing the user's telephone number or requesting the first party's telephone number.

22. A mobile telephone terminal as claimed in any one of claims 15 to 21, wherein if the terminal does not store the first party's telephone number it initiates communication by requesting a presence attribute for the first party.

23. A mobile telephone terminal as claimed in any one of claims 15 to 22 arranged to obtain automatically a telephone number from a received instant message.

24. A mobile telephone terminal as claimed in any one of claims 15 to 24 comprising a memory for storing a database in which the instant messaging address of the first party and a telephone number of the first party are associated together.

25. A mobile telephone terminal as claimed in claim 24 arranged to search the database for a telephone number using an associated instant messaging address.

26. A mobile telephone terminal as claimed in any one of claims 15 to 25 comprising:
option means for controlling a display to display a user selectable option or options;
selection means for enabling a user to select a displayed option;
a cellular radio transceiver arranged to initiate a telephone call; and
control means responsive to the selection means when the selected option indicates the initiation of a telephone call to initiate a telephone call using the cellular radio transceiver.

27. A method of changing the mechanism by which a first party and a second party communicate during a communication session comprising the steps of:
communicating via instant messaging between the first and second parties; and

displaying a user selectable option during the instant messaging to at least one of the parties, the selection of which initiates the establishment of a telephone call between the parties.

28. A system for providing communication between a first party and a second party using a telephone call and instant messaging, arranged to
switch a communication session between the parties from instant messaging to a telephone call.

29. A mobile telephone terminal comprising at least one mobile telephone application, wherein the mobile telephone application is arranged to display to a user a presence attribute indicator for a first party with an entry associated with the telephone number of the first party.

30. A mobile telephone terminal as claimed in claim 29, wherein the presence attribute indicator indicates any one or more of:
a) the availability of the first party for instant messaging;
b) the availability of the first party for a telephone call and/or text messaging;
c) a preferred method of contact for the first party; and
d) the amount of distraction the first party will accept.

31. A mobile telephone terminal as claimed in claim 30, wherein the presence attribute indicator indicates one or more of the following presence attributes: 'online status'; 'registration'; 'preferred contact'; and 'user availability' .

32. A mobile terminal as claimed in claim 29, 30 or 31 arranged to update automatically the displayed presence attribute indicator for a first party.

33. A mobile terminal as claimed in claim 29, 30, 31 or 32, comprising:
an instant messaging client arranged to subscribe, at a server, to presence attributes for a plurality of parties and arranged to receive from the server presence attribute information for each of the parties; and
processing means arranged to process the received presence attribute information and display, for each of the parties, a presence indicator with the entry in the mobile telephone application associated with the party.

34. A mobile terminal as claimed in any one of claims claim 29 to 32, comprising:

an instant messaging client arranged to get presence attribute information for a party from a server; and

a display for displaying a presence indicator with the entry in the mobile telephone application associated with the party.

35. A mobile telephone terminal as claimed in any one of claims 29 to 34 comprising a memory for storing a database in which the instant messaging address of the first party and a telephone number of the first party are associated together.

36. A mobile telephone terminal as claimed in claim 35 arranged to search the database for an instant messaging address using an associated telephone number.

37. A mobile telephone terminal as claimed in claim 35 or 36, arranged to search the database for a telephone number using an associated instant messaging address.

38. A mobile telephone terminal as claimed in any one of claims 29 to 37, wherein the mobile telephone comprises a cellular radio transceiver for transmitting and receiving in a cellular radio telecommunications network using predetermined communication mechanisms specified for that network and wherein the mobile telephone application is an application relating to transmission and/or reception of information using one or more of the specified communication mechanisms.

39. A mobile telephone terminal as claimed in any one of claims 29 to 38, wherein the mobile telephone application is a phonebook arranged to display multiple entries, each of which has an associated telephone number arranged to display a presence attribute indicator for a first party with the phonebook entry for the first party.

40. A mobile telephone terminal as claimed in any one of claims 29 to 39, wherein the mobile telephone application is a call register arranged to display multiple entries, each of which has an associated telephone number and arranged to display a presence attribute indicator for a first party with the call register entry for the first party.

41. A mobile telephone terminal as claimed in claim 40, wherein the call register displays a first set of multiple entries for missed calls and/or a second set of multiple entries for received calls and/or a second set of multiple entries for calls made.

42. A mobile telephone terminal as claimed in any one of claims 29 to 38, wherein the mobile telephone application is a text message register arranged to display multiple entries, each of which has an associated telephone number and arranged to display a presence attribute indicator for a first party with the call register entry for the first party.

43. A mobile telephone terminal as claimed in claim 42, wherein the text message register displays a first set of multiple entries for received text messages and/or a second set of multiple entries for text messages sent.

44. A mobile telephone terminal as claimed in any one of claims 29 to 43, wherein the mobile telephone application is arranged to provide a user, while displaying an entry associated with a first party, a selectable option for initiating instant messaging with the first party.

45. A mobile telephone terminal as claimed in claim 44, wherein the displayable entry is associated with the telephone number of the first party.

46. A mobile telephone as claimed in claim 44 or 45, wherein the terminal automatically initiates communication with the first party by instant messaging after user selection of the provided option without further user intervention.

47. A mobile telephone terminal as claimed in claim 44, 45 or 46, wherein the user selectable option is one of many user selectable options that are provided as a menu during a telephone call at the instigation of the user.

48. A mobile telephone as claimed in claim 47, wherein the instigation involves a single key-stroke during the telephone call.

49. A mobile telephone as claimed in claim 44, 45 or 46, wherein the user selectable option is selected by a single keystroke during the telephone call.

50. A mobile telephone terminal as claimed in any one of claims 29 to 49 arranged to automatically log on to an instant messaging server.

51. A mobile telephone terminal as claimed in claim 44, wherein if the terminal stores the first party's instant messaging address it initiates instant messaging by sending an instant message to the first party.

52. A mobile telephone terminal as claimed in claim 44, wherein if the terminal does not store the first party's instant messaging address it initiates instant messaging by sending the user's instant messaging address to the first party.

53. A mobile telephone terminal as claimed in any one of claims 29 to 52 arranged to obtain automatically an instant messaging address from a received text message.

54. A mobile telephone terminal as claimed in claim 44 comprising:

option means for controlling a display to display a user selectable option or options;

selection means for enabling a user to select a displayed option;

an instant messaging client arranged to initiate instant messaging; and

control means responsive to the selection means when the selected option indicates the initiation of instant messaging to enable the instant messaging client.

55. A method of controlling the user interface appearance of a mobile telephone terminal comprising the step of:

selecting an entry or entries of a mobile telephone application for which a presence attribute indicator will be obtained and displayed

56. A method of controlling the user interface appearance of a mobile telephone terminal comprising the step of:

obtaining and displaying presence attribute indicators for entries of a mobile telephone application.

57. A system comprising a server storing presence attribute information for a plurality of parties and a mobile telephone terminal

wherein the mobile telephone terminal comprises at least one application, from which a telephone call can be made to a party, arranged to display to a user a presence attribute indicator for the first party in dependence upon presence attribute information received from the server.

58. A mobile telephone terminal comprising at least one mobile telephone application, wherein the mobile telephone application is arranged to display an entry associated with a first party and to provide to a user, while displaying the entry, a selectable option for initiating instant messaging with the first party.

59. A mobile telephone as claimed in claim 58, wherein the terminal automatically initiates communication with the first party after user selection of the provided option without further user intervention.

60. A mobile telephone terminal as claimed in claim 58 or 59, wherein the user selectable option is one of many user selectable options that are provided as a menu at the instigation of the user.

61. A mobile telephone as claimed in claim 60, wherein the instigation involves a single key-stroke during the telephone call.

62. A mobile telephone as claimed in claim 59 or 60, wherein the user selectable option is selected by a single keystroke during the telephone call.

63. A mobile telephone terminal as claimed in any one of claims 58 to 62, arranged to automatically log on to an instant messaging server.

64. A mobile telephone terminal as claimed in any one of claims 58 to 63, comprising a memory for storing a database in which the instant messaging address of the first party and a telephone number of the first party are associated together.

65. A mobile telephone terminal as claimed in claim 64, arranged to search the database for an instant messaging address using an associated telephone number.

66. A mobile telephone terminal as claimed in any one of claims 58 to 65, wherein the displayable entry is associated with the telephone number of the first party.

67. A mobile telephone terminal as claimed any one of claims 58 to 66, wherein the mobile telephone comprises a cellular radio transceiver for transmitting and receiving in a cellular radio communications network using predetermined communication mechanisms specified for that network and the mobile telephone application is an application relating to transmission and/or reception of information using one or more of the specified communication mechanisms.

68. A mobile telephone terminal as claimed in any one of claims 58 to 67, wherein the mobile telephone application is a phonebook arranged to display multiple entries, each of

which has an associated telephone number and enables the initiation of a telephone call to the associated telephone number.

69. A mobile telephone terminal as claimed in any one of claims 58 to 68 wherein the mobile telephone application is a call register arranged to display multiple entries, each of which has an associated telephone number and enables the initiation of a telephone call to the associated telephone number.

70. A mobile telephone terminal as claimed in claim 69, wherein the call register displays a first set of multiple entries for missed calls and/or a second set of multiple entries for received calls and/or a second set of multiple entries for calls made.

71. A mobile telephone terminal as claimed in any one of claims 58 to 70, wherein the mobile telephone application is a text message register arranged to display multiple entries, each of which has an associated telephone number and enables the initiation of a text message communication to the associated telephone number.

72. A mobile telephone terminal as claimed in claim 71, wherein the text message register displays a first set of multiple entries for received text messages and/or a second set of multiple entries for text messages sent.

73. A mobile telephone terminal as claimed in any one of claims 58 to 72, wherein if the terminal stores the first party's instant messaging address it initiates instant messaging by sending an instant message to the first party.

74. A mobile telephone terminal as claimed in any one of claims 58 to 73, wherein if the terminal does not store the first party's instant messaging address it initiates instant messaging by sending the user's instant messaging address to the first party.

75. A mobile telephone terminal as claimed in any one of claims 58 to 74, arranged to obtain automatically an instant messaging address from a received text message.

76. A mobile telephone terminal as claimed in any one of claims 58 to 75, comprising:
option means for controlling a display to display a user selectable option or options;
selection means for enabling a user to select a displayed option;
an instant messaging client arranged to initiate instant messaging; and

control means responsive to the selection means when the selected option indicates the initiation of instant messaging to enable the instant messaging client.

77. A method of communicating with a first party from a mobile telephone application, comprising the steps of:
displaying an entry associated with a first party in a mobile telephone application; and
displaying a user selectable option for initiating instant messaging with the first party within the mobile telephone application.

78. A mobile telephone terminal arranged to display an entry associated with a first party and provide a customised menu of selectable options for initiating communication with the first party, wherein the selectable options displayed are dependent upon received presence attribute information for the first party.

79. A mobile telephone as claimed in claim 78, wherein the selectable options for communication include placing a telephone call and instant messaging

80. A mobile telephone as claimed in claim 79 wherein the displayed selectable options may include placing a telephone call, but not instant messaging

81. A mobile telephone as claimed in claim 79 or 80, wherein the displayed selectable options may include instant messaging but not placing a telephone call

82. A mobile telephone as claimed in any one of claims 78 to 81, wherein the selectable options displayed are dependent upon presence attribute information indicating the availability of the first party for instant messaging.

83. A mobile telephone as claimed in any one of claims 78 to 82, wherein the selectable options displayed are dependent upon presence attribute information indicating the availability of the first party for a telephone call.

84. A mobile telephone as claimed in any one of claims 78 to 83, wherein the selectable options displayed are dependent upon presence attribute information indicating the preferred method of contact for the first party

85. A mobile telephone as claimed in any one of claims 78 to 84, wherein the selectable options displayed are dependent upon presence attribute information indicating the amount of distraction the first party will accept.

86. A mobile terminal as claimed in claim in any one of claims 78 to 85, arranged for automatic updating of presence attribute information for a first party.

87. A mobile terminal as claimed in any one of claims 78 to 86, comprising:
an instant messaging client arranged to subscribe, at a server, to presence attributes for a plurality of parties and arranged to receive from the server presence attribute information for each of the parties; and
processing means arranged to process the received presence attribute information and create, for each party, a customised menu of selectable options for initiating communication.

88. A mobile terminal as claimed in any one of claims 78 to 87, comprising:
an instant messaging client arranged to get presence attribute information for a party from a server; and
processing means arranged to process the received presence information and create a customised menu of selectable options for initiating communication with the party.

89. A mobile telephone as claimed in any one of claims 78 to 88, wherein the terminal automatically initiates communication with the first party after user selection of the provided option without further user intervention.

90. A mobile telephone terminal as claimed in claim 78 or 79, wherein the customised menu is provided at the instigation of the user.

91. A mobile telephone as claimed in claim 90, wherein the instigation involves a single key-stroke.

92. A mobile telephone terminal as claimed in any one of claims 78 to 91, arranged to automatically log on to an instant messaging server.

93. A mobile telephone terminal as claimed in any one of claims 78 to 92, wherein the displayable entry is associated with the telephone number of the first party.

94. A mobile telephone terminal as claimed in any one of claims 78 to 93 comprising at least one mobile telephone application for placing a telephone call, wherein the mobile telephone application is arranged to display the entry associated with the first party.

95. A mobile telephone terminal as claimed in claim 94, wherein the mobile telephone application is a phonebook or a call register or a text message register.

96. A method of providing an intelligent choice of communication options to a user of a mobile telephone terminal comprising the steps of:
receiving presence attribute information for a first party; and
adapting the options, for initiating communication with the first party, displayed in to a user in dependence upon the received presence attribute information.

97. A terminal comprising:
an instant messaging client for participating in an instant messaging dialogue with one or more parties; and
a calendar application, for recording appointments, arranged to store the content of an instant messaging dialogue in an appointment record.

98. A terminal as claimed in claim 97 wherein the calendar application is arranged to initiate instant messaging and the recording of the instant messaging dialogue.

99. A terminal as claimed in claim 97 or 98, wherein an appointment record is user programmable to provide a reminder to a user at a user determined time.

100. A terminal as claimed in any one of claims 97 to 99, wherein the calendar application allows a user to indicate that a future appointment involves an instant messaging dialogue with identified parties.

101. A terminal as claimed in any one of claims 97 to 100, wherein the calendar application is arranged to automatically enable the log-on of the terminal to an instant messaging server.

102. A terminal as claimed in any one of claims 97 to 101, wherein the calendar application is arranged to display an appointment record and to provide to a user, while displaying the appointment record, a selectable option for initiating instant messaging with one or more parties identified in the appointment record.

103. A terminal as claimed in any one of claims 97 to 102, wherein the calendar application is arranged for automatic initiation of instant messaging at a user determined time.

104. A terminal as claimed in any one of claims 97 to 103, wherein the calendar application is arranged for automatic initiation of instant messaging with parties identified in the appointment record.

105. A terminal as claimed in any one of claims 97 to 104, wherein the calendar application is arranged to process presence attribute information for parties identified in an appointment record.

106. A terminal as claimed in any one of claims 97 to 105, wherein the calendar application is arranged to display a presence attribute indicator for a first party identified in a calendar appointment involving an instant messaging dialogue with the first party.

107. A terminal as claimed in any one of claims 97 to 106, comprising a memory for storing a database in which the instant messaging address of a first party and a telephone number of the first party are associated together.

108. A terminal as claimed in claim 107 arranged to search the database for an instant messaging address.

109. A method of recording a remote meeting comprising the steps of:
creating an appointment record for the remote meeting in a calendar application ;
initiating an instant messaging dialogue from within the appointment record ;
storing the content of an instant messaging dialogue; and
associating the stored instant messaging dialogue with the appointment record.

110. A mobile telephone terminal comprising: at least one application from which a telephone call and instant messaging can be initiated, wherein when the application accesses a stored telephone number of a party the stored instant messaging address of that party is automatically accessed or accessible and when the application accesses a stored instant messaging address of a party, the stored telephone number of that party is automatically accessed or accessible.

111. A mobile telephone terminal as claimed in claim 110, comprising:
a memory for storing a database in which an instant messaging address and a telephone number of a party are associated, wherein when the application accesses a telephone number of a party stored in the database, the associated instant messaging address is automatically accessed or accessible from the database and when the application accesses the instant messaging address of a party stored in the database, the associated telephone number of the party is automatically accessed or accessible from the database.

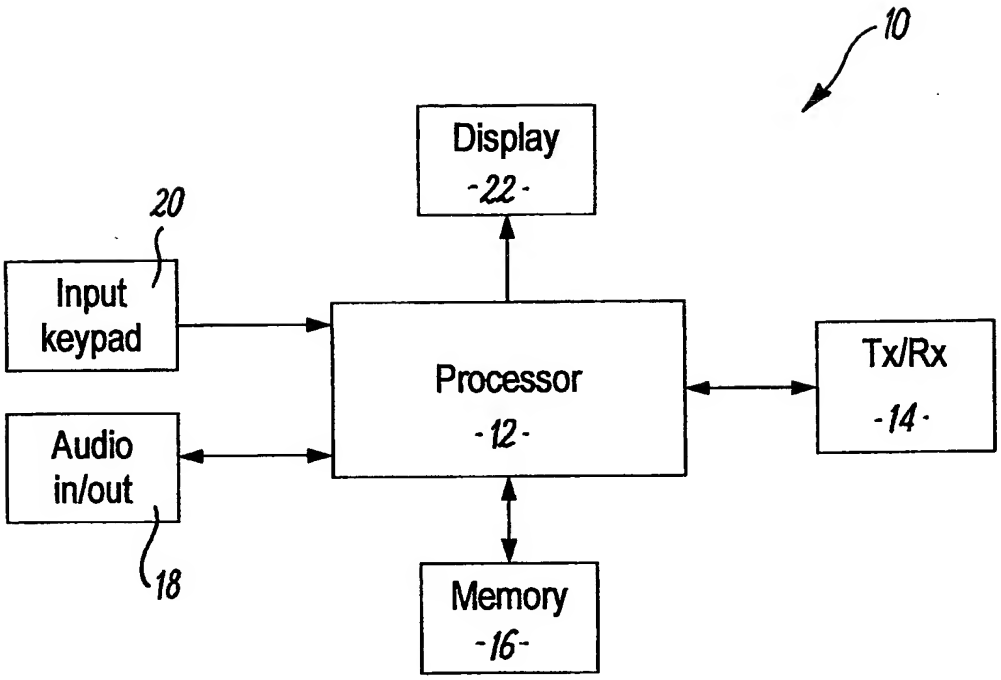
112. A mobile telephone terminal as claimed in claim 111 comprising a memory for storing a database in which the instant messaging address of the first party and a telephone number of the first party are associated together.

113. A mobile telephone terminal as claimed in claim 112, arranged to search the database for an instant messaging address using an associated telephone number.

114. A mobile telephone terminal as claimed in claim 112 or 113, arranged to search the database for a telephone number using an associated instant messaging address.

115. A mobile terminal substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.

116. Any novel subject matter or combination including novel subject matter disclosed, whether or not within the scope of or relating to the same invention as the preceding claims.


10
Display
-22-
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Input
keypad
Processor
-12-
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-14-
Audio
in/out
18
Memory
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FIG. 1

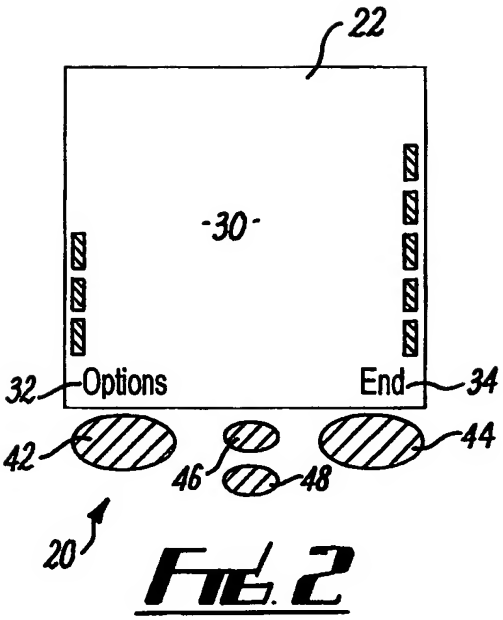


FIG. 2

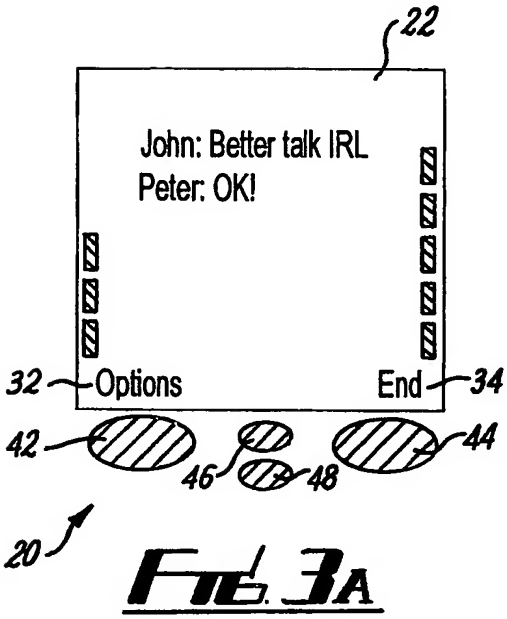


FIG. 3A

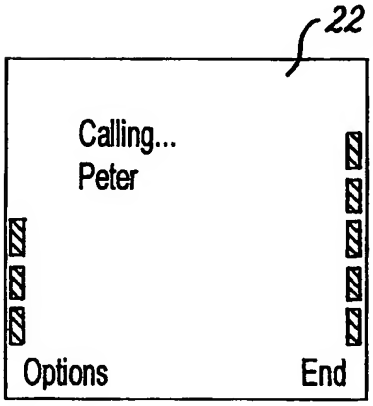


FIG. 3B

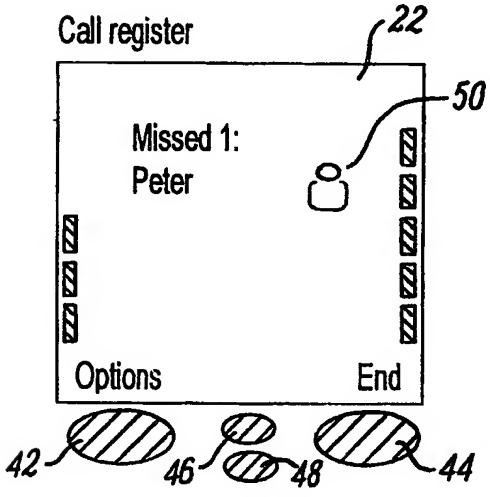
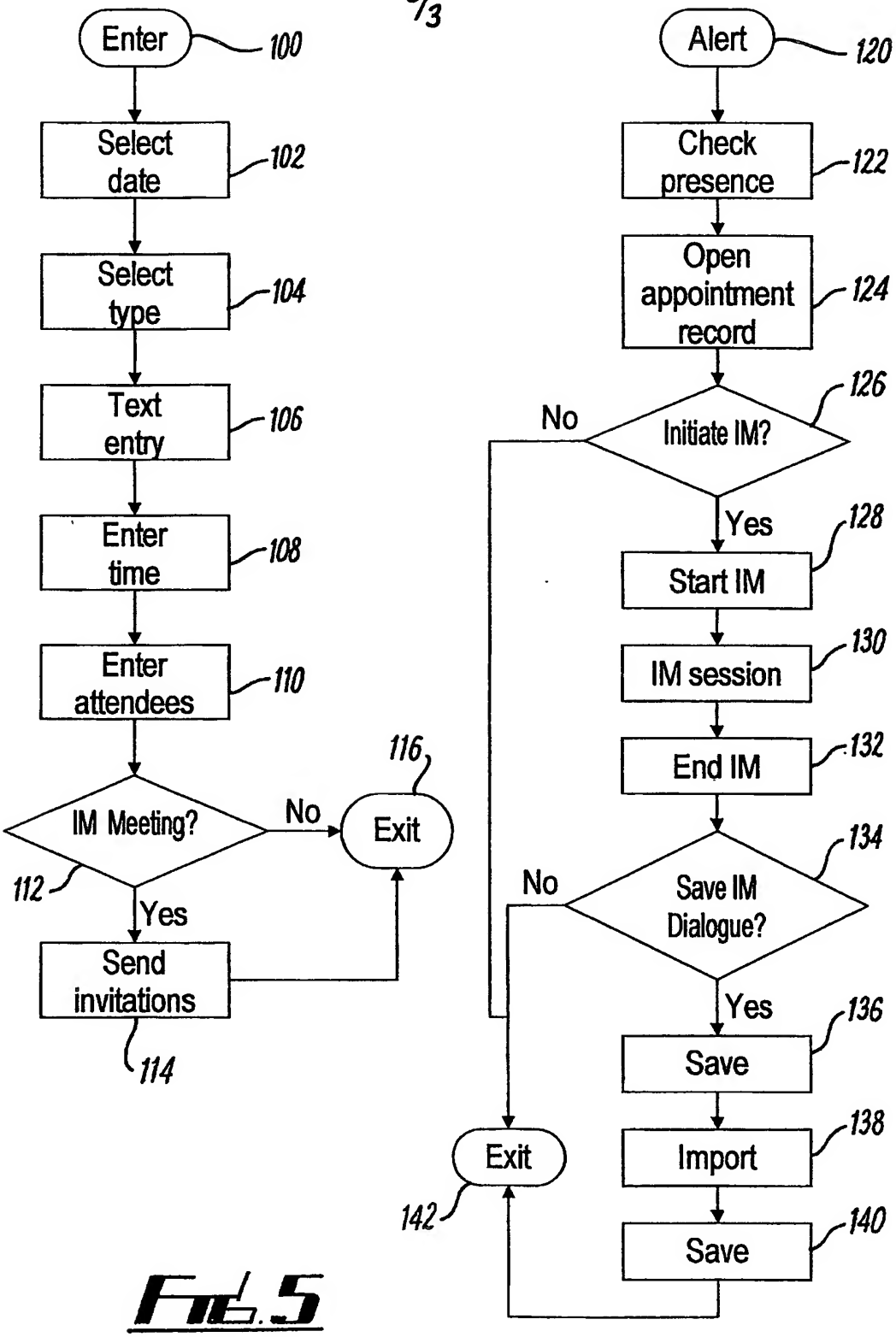


FIG. 4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100
Select date
102
Select type
104
Text entry
106
Enter time
108
Enter attendees
110
IM Meeting?
112
No
Exit
116
Yes
Send invitations
114
Alert
120
Check presence
122
Open appointment record
124
Initiate IM?
126
No
Yes
Start IM
128
IM session
130
End IM
132
Save IM Dialogue?
134
No
Yes
Save
136
Import
138
Save
140
Exit
142

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 02/05576

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/00, G06F 13/00, H04L 29/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0156308 A2 (INVERTIX CORPORATION), 2 August 2001 (02.08.01), page 1 - page 3, figures 1-10, abstract ---	1,13-15, 27-29,55-58, 77-78,96-97, 109-110
X	WO 0193047 A1 (MOTOROLA, INC.), 6 December 2001 (06.12.01), page 1, line 1 - page 2, line 15, figures 1-6, abstract ---	1,13-15, 27-29,55-58, 77-78,96-97, 109-110
X	EP 1130869 A1 (SONY INTERNATIONAL (EUROPE) GMBH), 5 Sept 2001 (05.09.01), page 2, line 1 - page 7, line 31, figures 7-15 ---	1,13-15, 27-29,57-58, 78,96-97

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 02/05576

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002165000 A1 (FOK, K.K.), 7 November 2002 (07.11.02), column 1 - column 2, figures 1-3, abstract	1,13-15, 27-29,55-58
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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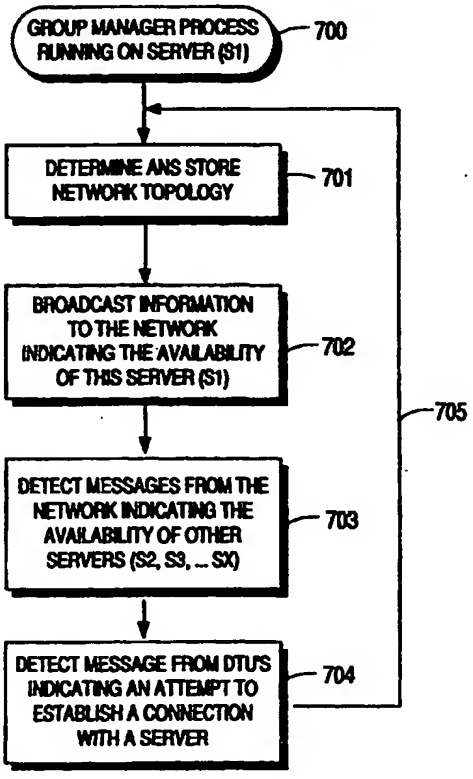
(54) Title: METHOD AND APPARATUS FOR MAKING A COMPUTATIONAL SERVICE HIGHLY AVAILABLE



(57) Abstract: The present invention provides a method and apparatus for making a computational service highly available in a multiple server computer environment. In the thin client computing paradigm, end user terminals rely on remote server computers for operation of most functions traditionally associated with personal computing. If the remote server computer fails, all of the user's computers will likewise fail. The present invention provides a solution by implementing a redundant server strategy and a redirection process. One or more servers hosting a communication to the terminal do not contain the only copy of permanent user data. This makes all session hosting servers interchangeable. If a server fails, the failure is detected and the terminal switches to another host server.

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METHOD AND APPARATUS FOR MAKING A COMPUTATIONAL SERVICE HIGHLY AVAILABLE

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates to the field of networked computer systems.

2. BACKGROUND ART

Computer users continue to desire high performance computing experiences in ever-changing computer environments. The computing paradigm is shifting. New architectures are emerging which require new solutions to deal with the need for a high performance computing experience. One such architecture is that of the thin-client computing system.

In the thin-client architecture, the functionality of the end user computer is reduced to the point that, for the most part, only input and output capabilities exist. The end user computer is connected over a high bandwidth computer network to a more powerful server computer that performs all the functions traditionally associated with the personal computer, such as executing computer programs and processing data.

An individual end user computer can be turned on and off, and the user loses no state (e.g., the services running on their behalf continue to run on the server computer). In this type of architecture, a large number of end users can connect to a limited number of servers in this manner wherein multiple end

users may be executing one or more computer processes on the same server. An inherent problem in this architecture is the danger that if the central server computer goes down, (during a power failure, for example), all of the end user terminals connected to it lose all of their state. Thus, the terminals are useless until the central computer is available again.

The evolution that led to this problem is better understood by reviewing the development of network computing. The idea is that network computers will access data and applications through a computer network, such as the internet, intranet, local area network, or wide area network. Only those applications that are needed for a particular task will be provided to the network computer. When the applications are no longer being used, they are not stored on the network computer.

Recently, a new computer system architecture referred to as the virtual desktop architecture has emerged. This system provides for a re-partitioning of functionality between a central server installation and the user hardware. Data and computational functionality are provided by data sources via a centralized processing arrangement. At the user end, all functionality is substantially eliminated except that which generates output to the user (e.g. display and speakers), takes input from the user (e.g. mouse and keyboard) or other peripherals that the user may interact with (e.g. scanners, cameras, removable storage, etc.)

All computing is done by one or more servers acting as central data sources and the computation is done independently of the destination of the data being generated. The output of a data source is provided to a terminal, referred to herein as a "Desktop Unit" (DTU). The DTU is capable of receiving the data and displaying the data.

The virtual desktop system architecture may be likened to other highly partitioned systems. For example, a public telephone company maintains powerful and sophisticated processing power and large databases at central offices. However, the DTU, (e.g., the telephone), is relatively simple and does not require upgrading when new features or services are added by the telephone company. The telephone itself becomes an appliance of low cost and extremely low obsolescence. Similarly, the display monitor of most computer systems has low obsolescence, and is typically retained through most desktop system upgrades.

The provision of services in the virtual desktop system architecture revolves around an abstraction referred to herein as a "session." A session is a representation of those services that are executing on behalf of a user at any point in time. The session abstraction is maintained by facilities known as the authentication and session managers, whose duty it is to maintain the database of mappings between tokens (i.e., unique identifiers bound to smart cards or other authentication mechanisms) and sessions, and to manage the services which make up each session.

For each user that the system is aware of there are one or more sessions. The session manager offers a service to the user that allows sessions to be configured and new sessions to be created. Many sessions routinely execute on each server. Since the central server computers traditionally maintain all of the state for this potentially vast pool of connected DTUs, if one of those central server computers goes down, the DTUs are useless until the central computer is available again. Thus, the central server is a single point of failure for a potentially large pool of users. If a high performance computing experience is to be provided in this evolving computer architecture, clearly a solution needs to address the single point of failure problem.

SUMMARY OF THE INVENTION

The present invention provides a method and apparatus for making a computational service highly available in a multiple server computer environment. In the thin-client computing paradigm, end user DTUs rely on remote server computers for operation of most functions traditionally associated with personal computing. These traditional functions include running computer programs and processing data. Since many users may be connected to one of the central server computers, if this central server computer fails, all of the users' DTUs will likewise fail.

The present invention provides a solution by implementing server redundancy and DTU redirection to maintain the availability of computing resources in a server failure situation. When the user connects over a DTU to a server, the user may begin to interact with their session (e.g., input may pass from the DTU to the server, and output may pass from the server to the DTU for user display). This user interaction may require permanently stored data to fulfill the user's attempted interactions (e.g., the session hosting server will need access to files, databases, mail servers, home directories, or calendars, for instance).

The server hosting the active session does not contain the sole copy of this permanent user data. That data is stored on another server. A redundant server storing the permanent user data is in communication with the session hosting server and has more stringent availability requirements, but provides this data

The server selected for a user depends on whether that user has one or more existing sessions within the failover group. If there are existing sessions, the user is bound to the server with which they were last connected. If there are no existing sessions, a server is selected using a load balancing mechanism that attempts to find the most lightly-loaded server. The DTU is redirected to the selected server, which creates a new session for the user.

Figure 8 is a pictorial representation of a possible network topology that may be maintained by a group manager process in accordance with the present invention.

Figure 9a is a flow control diagram of the steps performed by a DTU as it communicates with the network according to the protocol, in accordance with the present invention.

Figure 9b is a flow control diagram of server redirection in accordance with the present invention.

Figure 9c is a message flow diagram of server redirection in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates the virtual desktop system architecture of the present invention.

Figure 2 is a block diagram of an example computer system that can be used with the present invention.

Figure 3 is a block diagram of one embodiment of an DTU of the present invention.

Figure 4 illustrates a single chip DTU embodiment of the present invention.

Figure 5 illustrates an example of session management and authorization in the present invention.

Figure 6 illustrates the virtual desktop system architecture implementing the group manager process in accordance with the present invention.

Figure 7 is a flow control diagram of the steps performed by the group manager process in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, numerous specific details are set forth to provide a more thorough description of embodiments of the invention. It will be apparent, however, to one skilled in the art, that the invention may be practiced without these specific details. In other instances, well known features have not been described in detail so as not to obscure the invention.

One or more embodiments of the invention may implement the load distribution mechanisms described in U.S. Patent Application Serial No. __ _____, filed on February 25, 2000, entitled "Method and Apparatus for Distributing Load in a Computer Environment", and assigned to the present assignee, the specification of which is herein incorporated by reference.

One or more embodiments of the invention may also implement the mechanisms for improved resource utilization described in U.S. Patent Application Serial No. _____, filed on February 25, 2000, entitled "Method and Apparatus for Improving Utilization of a Resource on a Shared Client", and assigned to the present assignee, the specification of which is incorporated herein by reference.

The present invention provides a method and apparatus for making computational services highly available in a multiple server computer environment. The invention implements server redundancy and DTU redirection to maintain near continuous access to computing resources in a

server failure situation. When the user connects over a DTU to a server, the user may begin to interact with their session (e.g., input may pass from the DTU to the server, and output may pass from the server to the DTU for user display). To fulfill the user's attempts to interact, the server may require permanent data and need to access file systems, mail servers, or databases, for instance.

Permanent user data may be stored, for example, in one or more data servers that are in communication with the session hosting server, or stored in a manner such that the data can be recovered in the event of server failure. The server(s) storing the permanent user data has more stringent availability requirements than those servers that may host a session. Since the architecture allows for the server hosting the session to lack permanent user state (e.g., data stored more or less permanently), all session hosting servers are effectively interchangeable.

If a session hosting server fails, the present invention detects the failure and switches the DTUs using that server to an alternate session hosting server. In one embodiment, the user is allowed to invoke multiple sessions on different servers in the group. This embodiment provides mechanisms to switch among those sessions. In one embodiment, the invention uses a protocol having a self-discovery mechanism, which allows the invention to maintain a list of servers (e.g., the failover group) to which a set of DTUs can connect.

Each server runs a group manager process. Each group manager process generates a packet from time to time and broadcasts the packet to the network.

The packet contains a message. The message provides information about the network configurations of the server. In addition, the group manager process listens for similar broadcasted packets from all other group manager processes. In this way, each server communicates with all other servers in the group, so that each server has a global view of every server's network topology. This exchange of messages between servers allows a failover group of servers to be self-organizing. New servers may join a failover group through the exchange of these messages, with no a priori configuration.

With the information in the broadcasted packets, each group manager process records a complete network topology. When one server goes down, the group manager processes use their information to redirect the DTUs to available servers. The redundant store of permanent user data remains unaffected because it resides on a server outside the redirection process. The redirected server, also connected to the permanent data store residing elsewhere on another server, has access to the permanent data store as well. Hence, a failed server scenario, which in the prior art would cause loss of computational services to multiple users, is overcome through the use of a redundant server having a permanent data store and network redirection.

The above mechanisms will be discussed in further detail with reference to one or more system architectures. One such architecture is the virtual desktop system architecture described below.

Virtual Desktop System Architecture

In one embodiment, the present invention is implemented in the computer system architecture referred to as the virtual desktop system architecture. This material is described in co-pending U. S. Patent Application serial number 09/063,335, filed April 20, 1998, entitled "Method and Apparatus for Providing a Virtual Desktop System Architecture" and assigned to the present assignee, and incorporated herein by reference.

The virtual desktop system architecture provides for a re-partitioning of functionality between a central server installation and the user hardware. Data and computational functionality are provided by the servers via a centralized processing arrangement. At the user end, all functionality is eliminated except that which generates output to the user (e.g. display and speakers), takes input from the user (e.g. mouse and keyboard) or other peripherals that the user may interact with (e.g. scanners, cameras, removable storage, etc.).

Substantially all computing is done by the central servers and the computation is done independently of the destination of the data being generated. The output of the server is provided to the DTU. The DTU is capable of receiving the data and displaying the data. The functionality of the system is partitioned between a display and input device and servers. The display and input device is the DTU. The partitioning of this system is such that state and computation functions have been removed from the DTU and reside on servers.

In one embodiment of the invention, one or more servers communicate with one or more DTUs through some interconnect fabric, such as a network.

An example of such a system is illustrated in Figure 1. Referring to Figure 1, the system consists of servers 100 communicating data through interconnect fabric 101 to DTUs 102. It should be noted, however, that high availability strategies are not limited to the virtual desktop system architecture. Embodiments of the present invention are implemented in conjunction with a general purpose computer, like that described in Figure 2.

Embodiment of General-Purpose Computer Environment

One embodiment of the invention can be implemented as computer software in the form of computer readable program code executed on a general purpose computer such as computer 200 illustrated in Figure 2. A keyboard 210 and mouse 211 are coupled to a bi-directional system bus 218. The keyboard and mouse are for introducing user input to the computer system and communicating that user input to central processing unit (CPU) 213. Other suitable input devices may be used in addition to, or in place of, the mouse 211 and keyboard 210. I/O (input/output) unit 219 coupled to bi-directional system bus 218 represents such I/O elements as a printer, A/V (audio/video) I/O, etc.

Computer 200 includes a video memory 214, main memory 215 and mass storage 212, all coupled to bi-directional system bus 218 along with keyboard 210, mouse 211 and CPU 213. The mass storage 212 may include both fixed and

removable media, such as magnetic, optical or magnetic optical storage systems or any other available mass storage technology. Bus 218 may contain, for example, thirty-two address lines for addressing video memory 214 or main memory 215. The system bus 218 also includes, for example, a 32-bit data bus for transferring data between and among the components, such as CPU 213, main memory 215, video memory 214 and mass storage 212. Alternatively, multiplex data/address lines may be used instead of separate data and address lines.

In one embodiment of the invention, the CPU 213 is a microprocessor manufactured by Motorola, such as the 680X0 processor or a microprocessor manufactured by Intel, such as the 80X86, or Pentium processor, or a SPARC microprocessor from Sun Microsystems. However, any other suitable microprocessor or microcomputer may be utilized. Main memory 215 is comprised of dynamic random access memory (DRAM). Video memory 214 is a dual-ported video random access memory. One port of the video memory 214 is coupled to video amplifier 216. The video amplifier 216 is used to drive the cathode ray tube (CRT) raster monitor 217. Video amplifier 216 is well known in the art and may be implemented by any suitable apparatus. This circuitry converts pixel data stored in video memory 214 to a raster signal suitable for use by monitor 217. Monitor 217 is a type of monitor suitable for displaying graphic images.

Computer 200 may also include a communication interface 220 coupled to bus 218. Communication interface 220 provides a two-way data communication

coupling via a network link 221 to a local network 222. For example, if communication interface 220 is an integrated services digital network (ISDN) card or a modem, communication interface 220 provides a data communication connection to the corresponding type of telephone line, which comprises part of network link 221. If communication interface 220 is a local area network (LAN) card, communication interface 220 provides a data communication connection via network link 221 to a compatible LAN. Wireless links are also possible. In any such implementation, communication interface 220 sends and receives electrical, electromagnetic or optical signals which carry digital data streams representing various types of information.

Network link 221 typically provides data communication through one or more networks to other data devices. For example, network link 221 may provide a connection through local network 222 to host computer 223 or to data equipment operated by an Internet Service Provider (ISP) 224. ISP 224 in turn provides data communication services through the world wide packet data communication network now commonly referred to as the "Internet" 225. Local network 222 and Internet 225 both use electrical, electromagnetic or optical signals which carry digital data streams. The signals through the various networks and the signals on network link 221 and through communication interface 220, which carry the digital data to and from computer 200, are exemplary forms of carrier waves transporting the information.

Computer 200 can send messages and receive data, including program code, through the network(s), network link 221, and communication interface

220. In the Internet example, server 226 might transmit a requested code for an application program through Internet 225, ISP 224, local network 222 and communication interface 220.

The received code may be executed by CPU 213 as it is received, and/or stored in mass storage 212, or other non-volatile storage for later execution. In this manner, computer 200 may obtain application code in the form of a carrier wave.

The computer systems described above are for purposes of example only. An embodiment of the invention may be implemented in any type of computer system or programming or processing environment.

Computational Service Providers

With reference to the virtual desktop system architecture, computational power and state maintenance is found in the service providers, or services. The services are not tied to a specific computer, but may be distributed over one or more traditional desktop systems such as described in connection with Figure 2, or with traditional servers. One computer may have one or more services, or a service may be implemented by one or more computers. The service provides computation, state, and data to the DTUs and the service is under the control of a common authority or manager. In Figure 1, the services are found on computers 110, 111, 112, 113, and 114. It is important to note that the central data source can also be providing data that comes from outside of the central data

source 129, such as for example, the internet or world wide web 130. The data source could also be broadcast entities such as those that broadcast data such as television or radio signals 131. A service herein is a process that provides output data and responds to user requests and input.

It is the responsibility of the service to handle communications with the DTU that is currently being used to access the given service. This involves taking the output from the computational service and converting it to a standard protocol for the DTU. This data protocol conversion is handled in one embodiment of the invention by a middleware layer, such as the X11 server, the Microsoft Windows interface, a video format transcoder, the OpenGL interface, or a variant of the java.awt.graphics class within the service producer machine, although other embodiments are within the scope of the invention. The service machine handles the translation to and from the virtual desktop architecture wire protocol.

The service producing computer systems connect directly to the DTUs through the interconnect fabric. It is also possible for the service producer to be a proxy for another device providing the computational service, such as a database computer in a three tiered architecture, where the proxy computer might only generate queries and execute user interface code.

Interconnect Fabric

The interconnect fabric is any of multiple suitable communication paths for carrying data between the services and the DTUs. In one embodiment, the interconnect fabric is a local area network implemented as an Ethernet network. Any other local network may also be utilized. The invention also contemplates the use of wide area networks, the internet, the world wide web, an intranet, a local area network, and others. The interconnect fabric may be implemented with a physical medium such as a wire or fiber optic cable, or it may be implemented in a wireless environment.

Desktop Units

The DTU is the means by which users access the services. Figure 1 illustrates DTUs 121, 122, and 123. A DTU may consist of a display 126, a keyboard 124, mouse 125, and audio speakers 127. The DTU includes the electronics needed to interface these devices to the interconnect fabric and to transmit to and receive data from the services.

A block diagram of a DTU is illustrated in Figure 3. The components of the DTU are coupled internally to a PCI bus 319. A network controller 302 communicates to the interconnect fabric, such as an ethernet, through line 314. An audio codec 303 receives audio data on interface 316 and is coupled to network controller 302. USB data communication is provided on lines 313 to USB controller 301.

An embedded processor 304 may be, for example, a Sparc2ep with coupled flash memory 305 and DRAM 306. The USB controller 301, network controller 302 and embedded processor 304 are all coupled to the PCI bus 319. Also coupled to the PCI bus 319 is the video controller 309 with associated SGRAM 307. The video controller 309 may be for example, an ATI RagePro+ frame buffer controller that provides SVGA output on line 315. Data is optionally provided in and out of the video controller through video decoder 310 and video encoder 311 respectively. This data may comprise digital or analog video signals (e.g., NTSC (National Television Systems Committee), PAL (Phase Alternate Line), etc.). A smart card interface 308 may also be coupled to the video controller 309.

Alternatively, the DTU can be implemented using a single chip solution as illustrated in Figure 4. The single chip solution includes the necessary processing capability implemented via CPU 401 and graphics renderer 405. Chip memory 407 is provided, along with video controller/interface 406. A universal serial bus (USB) controller 402 is provided to permit communication to a mouse, keyboard and other local devices attached to the DTU. A sound controller 403 and interconnect interface 404 are also provided. The video interface shares memory 407 with the CPU 401 and graphics renderer 405. The software used in this embodiment may reside locally in non volatile memory or it can be loaded through the interconnect interface when the device is powered.

OPERATION OF THE VIRTUAL DESKTOP SYSTEM ARCHITECTURE

Session Handling

The provision of services in the virtual desktop system architecture revolves around an abstraction referred to herein as a session. A session is a representation of those services which are executing on behalf of a user at any point in time. A new session is created when a new token is presented through the DTU to the authentication manager. A token is a unique identifier, which may be an ethernet address of a DTU (pseudo-token) or the serial number on a smart card.

The session abstraction is maintained by facilities known as the authentication and session managers, whose duty it is to maintain the database of mappings between tokens and sessions, and to manage the services which make up each session. For each token that the system is aware of the fact that there are one or more sessions. The session manager offers a service to the user or administrator that allows sessions to be configured and new sessions to be created.

A non pseudo-token session is not tied to any particular DTU. A token is associated with the user session, and the session can be displayed on any DTU where the user inserts his or her smart card. An software process known as the authentication manager is responsible for ensuring the legitimacy of a token and associating a token with its desired session. The DTU is typically in sleep, stand-

by, or off mode when not in use. When a user wants to use a particular DTU, the user's access is validated in an authentication exchange that may comprise one or more of a smart card, key, password, biometric mechanism, or any other suitable authentication mechanism. The token extracted from this exchange is then used to establish a connection to the appropriate session

When the authentication manager validates a token, it notifies the server's session manager, which in turn notifies all of the services within the selected session, and the session's display is composed at the server and transmitted to the user's desktop. From within a session, a user can interact with existing services, initiate new services, or kill off executing services. When the user departs from the DTU (e.g., by withdrawing a smart card) the authentication manager notes this and notifies the session manager, which in turn notifies all of its related services, which stop their display functions, and the DTU returns to its dormant state. The effect of the activation and deactivation of an DTU is similar to turning off the display monitor on a desktop system. The services of the user's session are still available and perhaps executing, but no display is generated. One advantage of the present invention is that the services available in a session can be accessed on any connected DTU.

Figure 5 provides an example of session management and authorization in the present invention. This material is described in co-pending U. S. Patent Application serial number 09/063,339, filed April 20, 1998, entitled "Method and Apparatus for Session Management and User Authentication" and assigned to the present assignee, and incorporated herein by reference. Network terminal

502 is a DTU, having the task of displaying output of services to a user and obtaining input to services from the user. Network terminal 502 has the ability to respond to a command (e.g., display command) received from, for example, a software program (e.g., services 530-538, authentication manager 504 and session manager 506) executing on a computational service provider. The input received from a user is forwarded to, for example, a service that is fulfilling a user request.

A service is a program that performs some function for a user. More than one server can execute the services that comprise a session. For example, in session 508, service 530 is executing on server 510, services 532 and 534 are executing on server 512 and services 536 and 538 are executing on server 514.

A user accesses a system (e.g., a server, a session, a service and a network terminal) by initiating a login. During login, the user is validated by authentication manager 504. Various techniques can be used to allow the user to initiate a login. For example, the user can initiate a login by pressing a key on network terminal 502.

In one embodiment, a user accesses the system by inserting a smart card in a card reader (e.g., card reader 516) attached to network terminal 502. A smart card is a card that is capable of storing information such as in a magnetic strip or memory of the smart card. The smart card can store user information such as a user's identification (i.e., user ID such as a 64-bit number) and,

optionally, a secret code (e.g., a 128-bit random number) that is transmitted to network terminal 502. The secret code may be used during authentication.

Network terminal 502 is aware of (or can obtain) its interconnection network address and the address of authentication manager 504. When a user initiates the login, network terminal 502 initiates communication with authentication manager 504 to begin authentication. Authentication manager 504 is a program active (e.g., executing) on a server connected to network terminal 502 via an interconnection network such as a local area network (LAN), for example. It should be apparent, however, that network terminal 502 can be connected to authentication manager 504 using other interconnection network technologies such as a fiber channel loop, point-to-point cables, or wireless technologies. Network terminal 502 sends a startup request to authentication manager 504 that includes a user identification (userID).

If the expected result is received from the user, authentication manager 504 notifies session manager 506 (via a connect message) that the user has logged into the system on network terminal 502. Session information contained in authentication database 518 is used to identify the server, port and session identifier (ID) for session manager 506. Session manager 506 is a program that is active on a computational service provider and is connected to authentication manager 504 and network terminal 502 via an interconnection network, for example. Authentication manager 504 sends a message to session manager 506 using session manager 506's server and port information contained in authentication database 518.

In response to the connect message from authentication manager 504, session manager 506 notifies the services in the user's current session (i.e., the services in session 508) that the user is attached to network terminal 502. That is, session manager 506 sends a connect message to services 530-538 to direct output to network terminal 502. Session manager 506 ensures that services that are considered to be required services of the session are executing. If not, session manager 506 causes them to be initiated. The user can interact with services 530-538 within a session (e.g., session 508). Network terminal 502 is connected to servers 510, 512 and 514 (and services 530-538) via an interconnection network such as a local area network or other interconnection technology. The user can also start new services or terminate existing services.

The user can quit using the system by removing the card from card reader 516. Other mechanisms to quit the system can also be used with the invention (e.g., a "sign-off" button on network terminal 502). Services 530-538 can continue to run even after the user removes the card from card reader 516. That is, a user's associated session(s) and the services that comprise a session can continue in existence during the period that a user is logged off the system. When the user removes the card from card reader 516, network terminal 502 notifies authentication manager 504 (e.g., via a disconnect message) which notifies session manager 506 (e.g., via a disconnect message). Session manager 506 notifies services 530-538 (e.g., via a disconnect message) which terminate their transmission of display commands to network terminal 502. Services 530-538 continue execution, however, during the time that the user is away from

a network terminal. The user can log back in using a network terminal such as network terminal 502, to connect to session 508 and interact with services 530-538.

OPERATION OF THE SELF-DISCOVERY MECHANISM

One embodiment of the present invention implements a protocol which uses a self-discovery mechanism. When a server fails, the DTU knows that the server has failed because it no longer receives timely messages from the server. Thereafter, the DTU begins a connection sequence in which it communicates, for example using DHCP, to obtain its location and the location of a potential server, which can be in the form of IP addresses. Once a server is found, the DTU can connect to this server.

If the connection fails, the DTU broadcasts messages (e.g., a "serverQ" message) to other servers. The other servers respond and a connection is established to one of the servers. Since the sole copy of permanent user data does not reside on either the failed server, or the target server for redirection, they are effectively interchangeable from the user's perspective. Once redirection occurs, access to data is possible on the new host for the user's session.

The Group Manager Process

Each server runs a group manager process. Referring to figure 6, group manager processes 601a and 601b run on servers 600a and 600b and are connected over a computer network to DTUs 602. The group manager process operates in accordance with figure 7. The group manager process 700 gathers and stores a description of the network topology 701, which may be stored in a table. In one embodiment, the group manager 700 reads the network configuration of its server by looking to the kernel to see what network interfaces are connected to it. Periodically, the group manager process creates a packet by which it broadcasts this information 702 to the network indicating the availability of the server upon which the group manager process is running. In one embodiment, this broadcast of the packet occurs using the unreliable datagram protocol, wherein message broadcasting is a uni-directional communication.

Each group manager process listens in order to detect packets of information 703 from other group manager processes indicating the availability of other servers. With this information the group manager process constructs a table of other hosts heard from. This table represents the topology of the network. The group manager process additionally listens to messages on the network broadcast by DTUs attempting to establish a communication link to that server upon which the group manager process resides 704. This process repeats from time to time, as indicated by transition 705.

Figure 8 is a pictorial representation of a possible network topology description constructed by a group manager process. DTUs 1 through x, designated 800-808, connect via interconnect fabrics 809-817 to a switch 818. In turn, the switch 818 connects via interconnect fabrics 819-823 to session hosting servers s1 through sx, designated as 824-828. The servers themselves are interconnected by the fabric via switch 818 which allows for redirection. In addition, server sy 829 contains the permanent store of user data. In one embodiment, server sy 829 is connected via a separate LAN (local area network) or other network to session hosting servers s1-sx using network interfaces 830 and 832 through 836. By each group manager broadcasting its network information, every group manager in the network will have a complete view of the system.

In one embodiment, each group manager process sends a broadcast (or multicast) "host" message to the network ports indicating the configuration of all interfaces connected to the server. In this embodiment, the group manager processes on each server also listens to the ports for host messages from other servers in the group. With these messages, each group manager process constructs a list of servers and shared interfaces, including network-addressing information. This information is used to determine which DTUs can connect to which servers, when there are a multiplicity of network interfaces on the servers.

As an example, a host server named "mud" may broadcast the following host message on all interfaces every twenty seconds:

```
host=mud addr=81907f05 time=950739941 numifs=2 flags=4
cpus=2 clock=248 interface=hme0 ip=81907f05
mask=ffffff00 bcast=81907fff interface=ge0 ip=c0a88003
mask=ffffff00 bcast=c0a880ff
```

where "host" is the host name of a server (e.g., "mud"), "addr" is the primary network address of this host, "numifs" is the number of network interfaces on this host, "interface" is the name of a network interface on this host, "ip" is the IP address of the preceding interface, "mask" is the IP netmask of the preceding interface, and "bcast" is the IP broadcast address of the preceding interface. Additionally, each host message may be signed by the group manager process of the sending server, using a group manager secret known only to a trusted group of servers.

The network topology may be represented, for example, as a table of hosts (i.e., servers) and network information as illustrated in Table A below, which shows one server's group manager view of the network topology (values shown in hexadecimal). In addition to the definitions provided with respect to the host message above, the following definitions apply to Table A below: "lastseen" is the number of seconds since the last packet was received from the respective host (server); "timeoff" is the time difference between host05 (the first listed server) and the respective host; "TRUSTED" indicates that the respective host uses the same group manager secret to sign messages; and "lastpkt" is the time in seconds since a packet was received on the preceding interface (-1 indicates a packet has never been received on that interface).

TABLE A

```
Host host05 lastseen 4 timeoff 0 addr 8190a705 numifs 2 TRUSTED
interface ge0 ip c0a88001 mask ffffff00 bcast c0a880ff lastpkt 4
interface hme0 ip 8190a705 mask ffffff00 bcast 8190a7ff lastpkt 4

Host host22 lastseen 16 timeoff 25 addr 8190a716 numifs 3 TRUSTED
interface le0 ip 8190a716 mask ffffff00 bcast 8190a7ff lastpkt 16
interface qfe0 ip c0a88101 mask ffff0000 bcast c0a8ffff lastpkt -1
interface qfe1 ip c0a88201 mask ffff0000 bcast c0a8ffff lastpkt -1

Host host21 lastseen 15 timeoff 43 addr 8190a715 numifs 2 TRUSTED
interface hme0 ip 8190a715 mask ffffff00 bcast 8190a7ff lastpkt 15
interface hme1 ip c0a88001 mask ffff0000 bcast c0a8ffff lastpkt -1

Host mud lastseen 1 timeoff 39 addr 81907f05 numifs 2 TRUSTED
interface hme0 ip 81907f05 mask ffffff00 bcast 81907fff lastpkt -1
interface ge0 ip c0a88003 mask ffffff00 bcast c0a880ff lastpkt 1

Host host45 lastseen 18 timeoff 26 addr 8190a72d numifs 2 TRUSTED
interface hme0 ip 8190a72d mask ffffff00 bcast 8190a7ff lastpkt 18
interface hme1 ip c0a88001 mask ffffff00 bcast c0a880ff lastpkt -1

Host host41 lastseen 18 timeoff -81 addr 8190a729 numifs 2 TRUSTED
interface hme0 ip 8190a729 mask ffffff00 bcast 8190a7ff lastpkt 18
interface le0 ip c0a88001 mask ffffff00 bcast c0a880ff lastpkt -1
```

Each DTU is assigned a network address when it starts up. In one embodiment, this network address may be an IP address assigned using the Dynamic Host Configuration Protocol (DHCP). Given this IP address and the network information in Table A, a server can determine the subset of servers to which the DTU is able to connect. The server also uses this information to monitor which of the other servers are up and running. A server or interface may be declared "down" if the "lastseen" time for the host or the "lastpkt" time for an interface exceed a limit, e.g., sixty seconds.

The Self Discovery Protocol

The DTU communicates with the network in the manner displayed in figure 9a. First, a user accesses DTU 900. For instance, the user may power up the DTU at this point 901. A given DTU always has a connection to at least one server in the network. This connection is established at step 901 where the user powers up the DTU. Upon power up, the DTU broadcasts messages using a protocol, which in one embodiment can be called to the kernel of the server, and received by the group manager process residing on the server where the connection is to be made 902.

Once a connection is established, the DTU 900 periodically receives messages from the group manager 903 regarding the availability of that server. If the server is available 904, flow proceeds along transition 905 and the DTU continues to listen to availability messages from the group manager. If after a certain time, no message is received, it is presumed that the server has crashed, and flow proceeds along transition 906.

Thereafter, the DTU begins to listen for messages from other group manager processes residing on other servers regarding their availability 907. The DTU decides if these servers are available 908. If they are not available, flow proceeds along transition 909 and the DTU continues to listen until they are. If they are available, flow proceeds along transition 910, the DTU establishes communications with the group manager process which resides upon the available server, and the process repeats with steps 902-910.

In one embodiment, if the server specified by the booting DTU does not respond, the DTU sends a broadcast "serverQ" message to be received by one or more other servers on the network. When another server receives the serverQ message, it responds with a serverR message to the requesting DTU, giving it network information. This information can include, for instance, the server's IP address on the subnet to which the DTU belongs. When serverR responses are received from one or more servers, the DTU attempts to connect to the responding servers until successful.

The flow of the redirection process is shown in figure 9b. Group manager process 601 runs on server s1. A DTU attempts to initiate a session on the first available server, which receives its broadcast message, for instance on server s1 911 by sending an "insert" event with a token. The group manager process on server s1 then reads the packet to determine whether redirection has occurred 912. If so, the group manager determines whether a session exists on s1 for that token 913. If a session does exist, the DTU is connected to that session 914. If a session does not exist, a new session 915 is created.

If redirection has not occurred at step 912, the group manager process of server s1 determines other servers (s2, . . ., sx) that the DTU can connect to 916. Next, the servers that the DTU can connect to (s1 . . . sx) are sent messages by the group manager process of server s1, specifying the token from the DTU 917. Thereafter, the group manager process of server s1 receives responses 918 from servers (s1, . . ., sx), specifying the existence (or not) of a session for the given

token. The group manager process determines whether a session exists on at least one server for the token 919. If a session does not exist, a new session is created on server s1 for the token 915. If a session does exist, the target server selected is the one with the most recent session available for the token 920. The group manager process then determines whether the target server is the current server 921. If the target server is not the current server, a redirect message is sent to the DTU 922, telling it to redirect to the target server st. If the target server is the current server, a transition to step 913 is made.

Figure 9c provides a message flow diagram for server redirection. Servers s1 923, s2 924, and s3 925 and DTU 926 pass messages. DTU 926 sends an insert event 927 (with cause = "insert") to server 923. After passing tokenQ and tokenR messages, server 923 becomes aware of the fact that a session exists for token t1 on server 924. Server 923, therefore, sends a redirect message to DTU 926. Thereafter, DTU 926 sends an insert event 928 to server 924. Note that part of the message indicates that this is a redirect (i.e., cause = "redirect"), thereby bypassing a repeated authentication attempt.

After collecting tokenR responses from the candidate servers, in one embodiment, the group manager process on the server that originally received the insert event (server 923) chooses a server to which to forward the DTU by choosing the session with the latest time of last connection. The group manager then sends a redirect message to the DTU, telling it to reconnect to the new server. The DTU breaks the connection with the current server, reconnects to the new server, and sends an insert event with a cause field of "redirect." The

"redirect" cause prevents the new server from doing the server selection all over again. The DTU is connected to the session identified by the token.

As a security measure, one embodiment signs messages broadcast throughout the network. For example, one embodiment may use a keyed SHA1 hash algorithm. The key is derived from a local key file on each server, which must be identical on all of the servers for the servers to trust each other. Host messages are always accepted. Only messages with the correct signature are accepted as "TRUSTED" hosts. TokenQ and tokenR messages are only exchanged among TRUSTED hosts in this embodiment.

In one embodiment, when a server fails, the DTU detects the failure when it does not receive timely responses to a "keep alive" message. Upon failure to receive a response to the "keep alive" message, the DTU sends messages to a new server using the serverQ/serverR protocol previously described. Thus, when a server fails, the protocol allows for a reconnection of all DTUs to an active server. The failed over session can resume on the new server and make use of the permanent user data coupled to all host servers in the group.

Thus, a method and apparatus for making a computational service highly available in a multiple server computer environment has been provided in conjunction with one or more specific embodiments. The invention is defined by the claims and their full scope of equivalents.

CLAIMS

We claim:

1. A method of making a computational service available comprising:
initiating a communication between a unit and a first server;
determining a location of a session on one of a plurality of servers; and
redirecting said unit to a second server having said session.

2. The method of claim 1, wherein said initiating comprises:
said unit broadcasting a message to said plurality of servers; and
said first server responding to said message.

3. The method of claim 1, wherein said initiating is in response to a prior server failing.

4. The method of claim 1, wherein said session is associated with a token.

5. The method of claim 4, wherein said determining comprises:
said first server sending a message to said plurality of servers, said message comprising said token; and
said plurality of servers responding to said first server with session information associated with said token.

6. The method of claim 1, further comprising determining a most recent session from a plurality of sessions.

7. The method of claim 1, further comprising securing messages between said unit and said servers.

8. The method of claim 7, wherein said securing is performed with a keyed hash signature.

9. A method of making computational services available comprising:
a first server receiving a host message from a second server; and
said first server forming a network topology using said host message.

10. The method of claim 9, wherein said host message is sent repeatedly.

11. The method of claim 10, further comprising updating status in said network topology based on a relationship between multiple host messages.

12. The method of claim 9, wherein said host message is broadcast to a group of servers.

13. The method of claim 12, further comprising securing said message with a key known to a trusted group of servers.

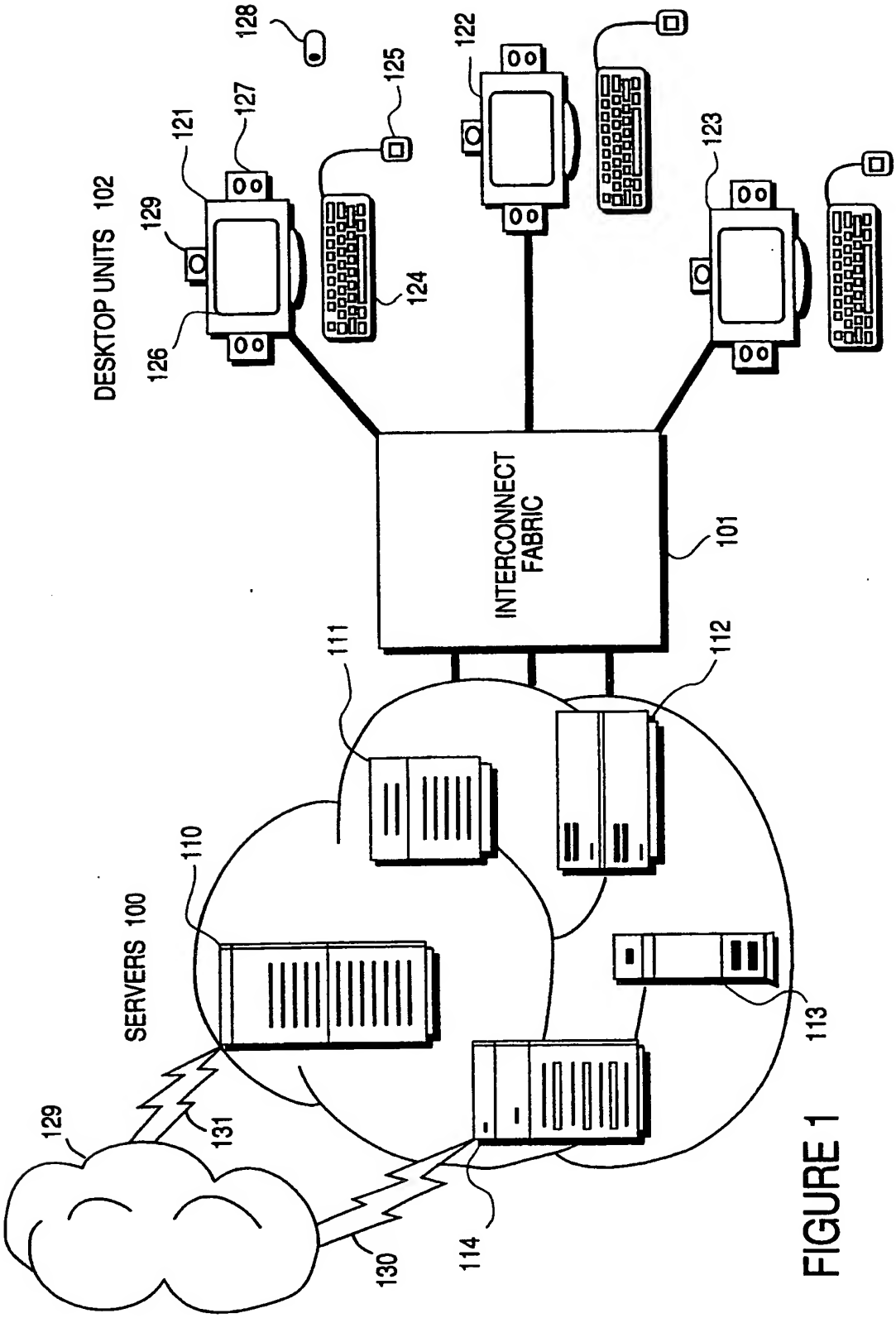
DESKTOP UNITS 102
121
127
128
125
122
123
129
124
126
INTERCONNECT FABRIC
101
111
112
SERVERS 100
110
113
129
131
130
114

FIGURE 1

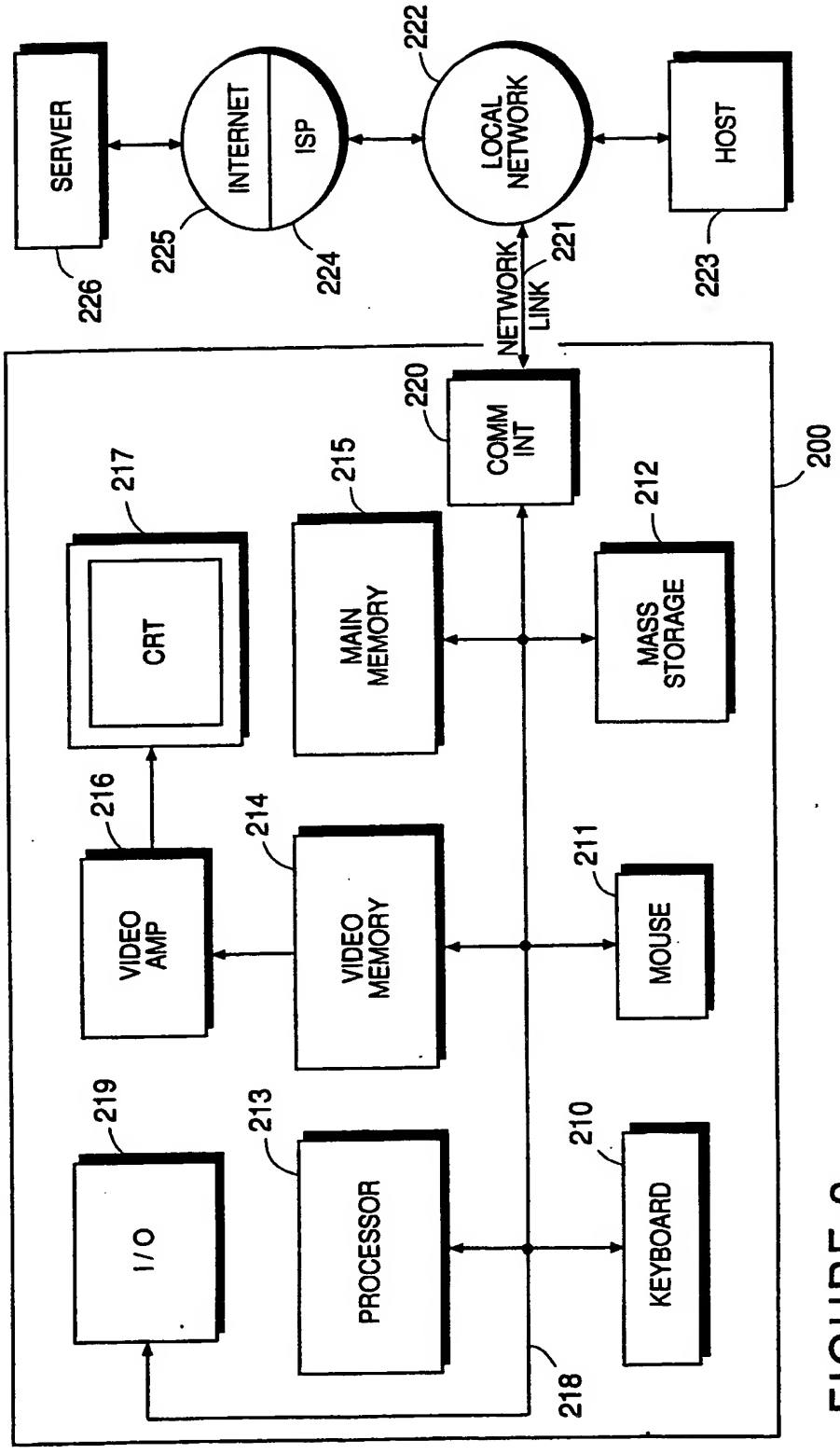
SERVER
226
INTERNET
ISP
225
224
222
LOCAL NETWORK
221
NETWORK LINK
HOST
223
200
220
COMM INT
217
CRT
215
MAIN MEMORY
212
MASS STORAGE
216
VIDEO AMP
214
VIDEO MEMORY
211
MOUSE
219
I/O
213
PROCESSOR
210
KEYBOARD
218

FIGURE 2

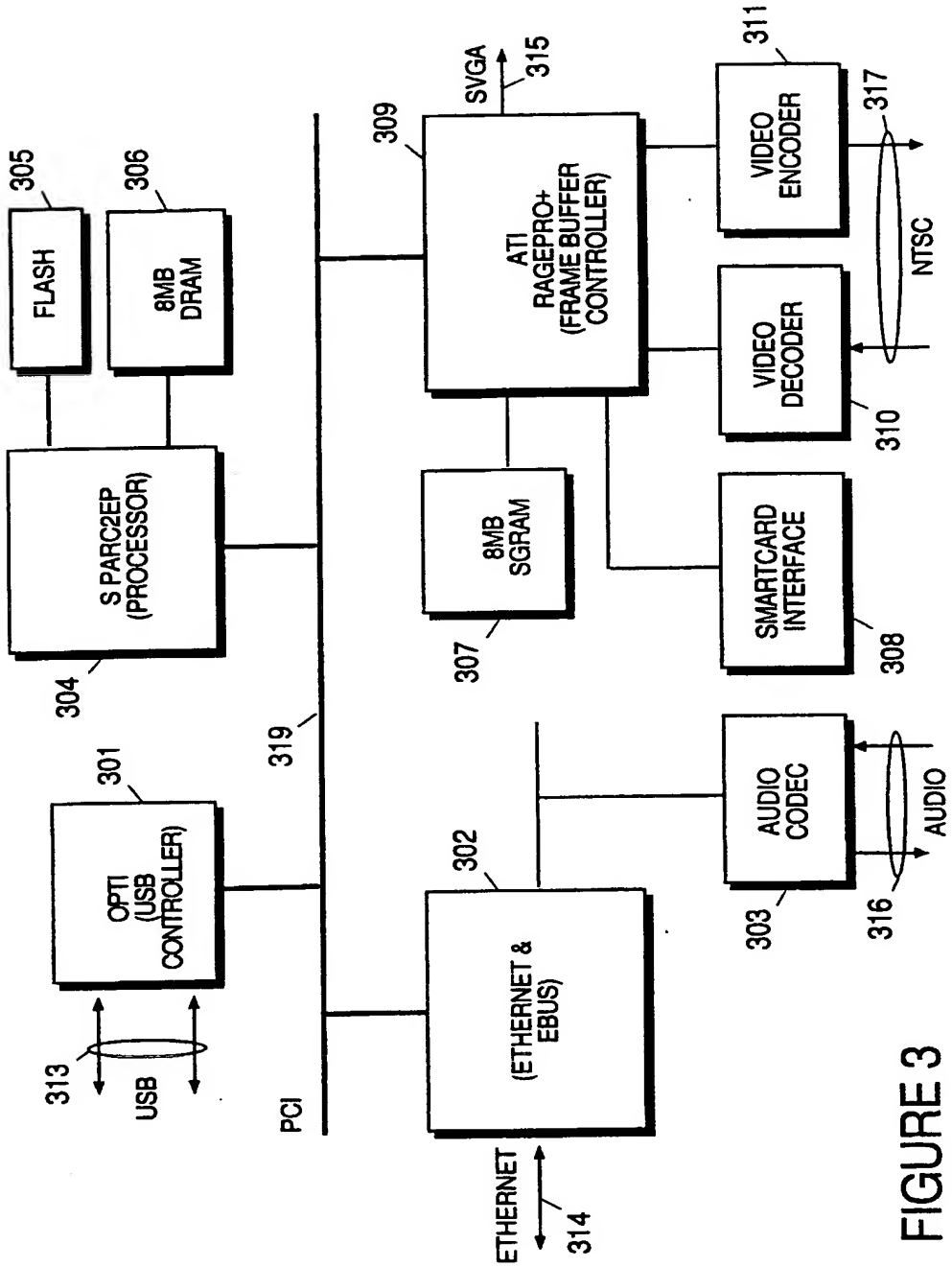
305
FLASH
306
8MB DRAM
S PARC2EP (PROCESSOR)
304
301
OPTI (USB CONTROLLER)
313
USB
319
PCI
309
SVGA
315
ATI RAGEPRO+ (FRAME BUFFER CONTROLLER)
8MB SGRAM
307
302
(ETHERNET & EBUS)
ETHERNET
314
311
VIDEO ENCODER
317
NTSC
VIDEO DECODER
310
SMARTCARD INTERFACE
308
AUDIO CODEC
303
316
AUDIO

FIGURE 3

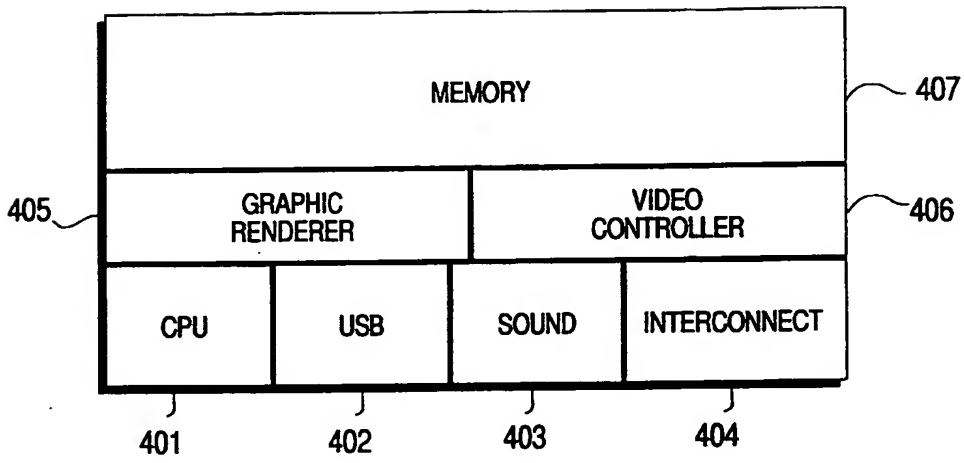
MEMORY
407
405
GRAPHIC RENDERER
VIDEO CONTROLLER
406
CPU
USB
SOUND
INTERCONNECT
401
402
403
404

FIGURE 4

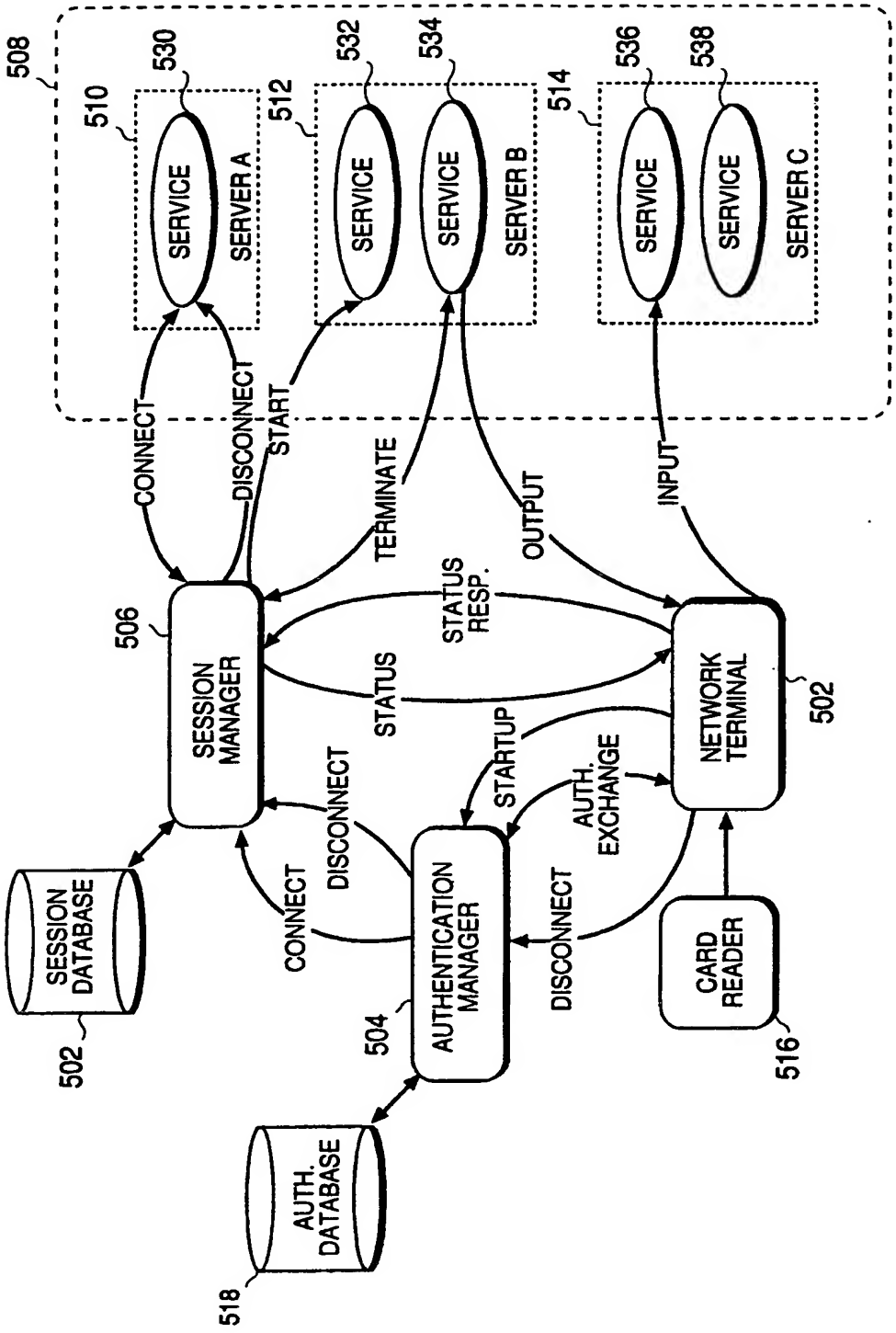
508
510
530
SERVICE
SERVER A
512
532
534
SERVICE
SERVICE
SERVER B
514
536
538
SERVICE
SERVICE
SERVER C
CONNECT
DISCONNECT
START
TERMINATE
OUTPUT
INPUT
506
SESSION MANAGER
STATUS RESP.
STATUS
NETWORK TERMINAL
502
STARTUP
AUTH. EXCHANGE
DISCONNECT
CONNECT
DISCONNECT
SESSION DATABASE
502
AUTHENTICATION MANAGER
504
DISCONNECT
CARD READER
516
AUTH. DATABASE
518

FIGURE 5

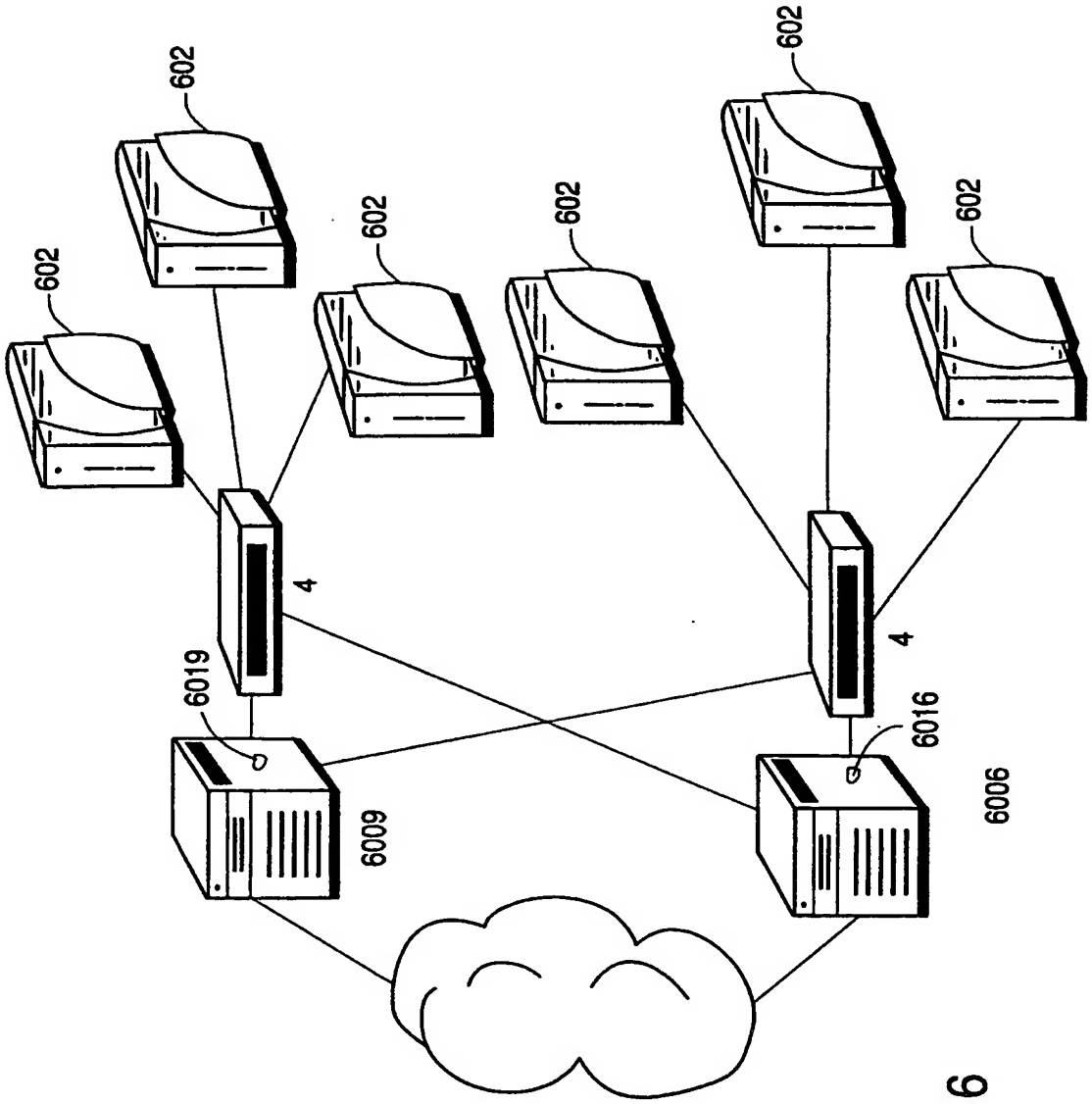

FIGURE 6

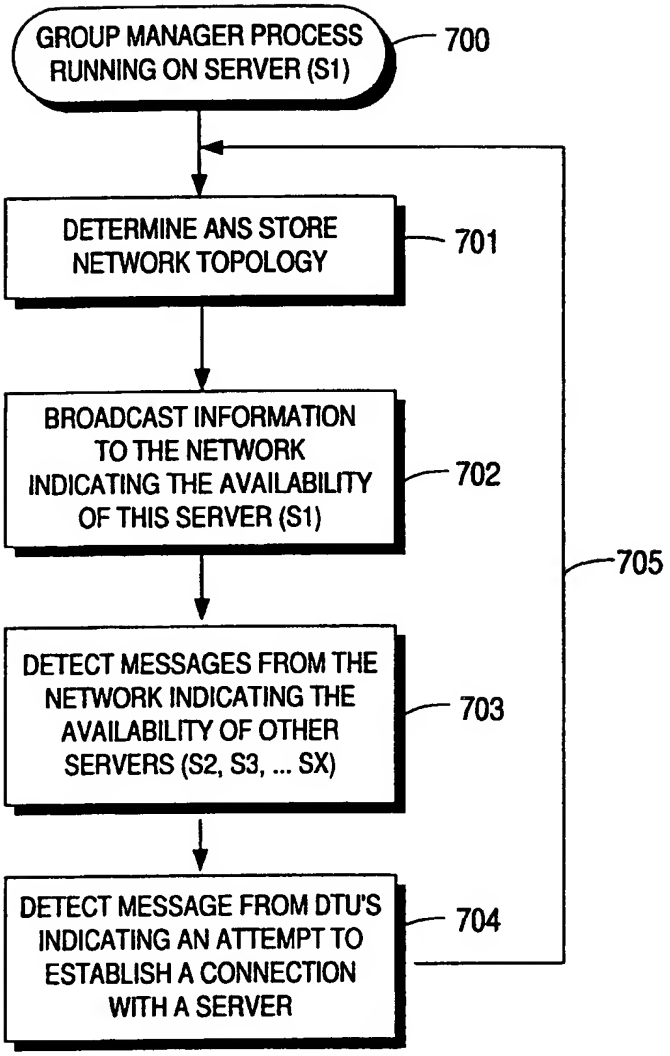
GROUP MANAGER PROCESS RUNNING ON SERVER (S1)
700
DETERMINE ANS STORE NETWORK TOPOLOGY
701
BROADCAST INFORMATION TO THE NETWORK INDICATING THE AVAILABILITY OF THIS SERVER (S1)
702
DETECT MESSAGES FROM THE NETWORK INDICATING THE AVAILABILITY OF OTHER SERVERS (S2, S3, ... SX)
703
DETECT MESSAGE FROM DTU'S INDICATING AN ATTEMPT TO ESTABLISH A CONNECTION WITH A SERVER
704
705

FIGURE 7

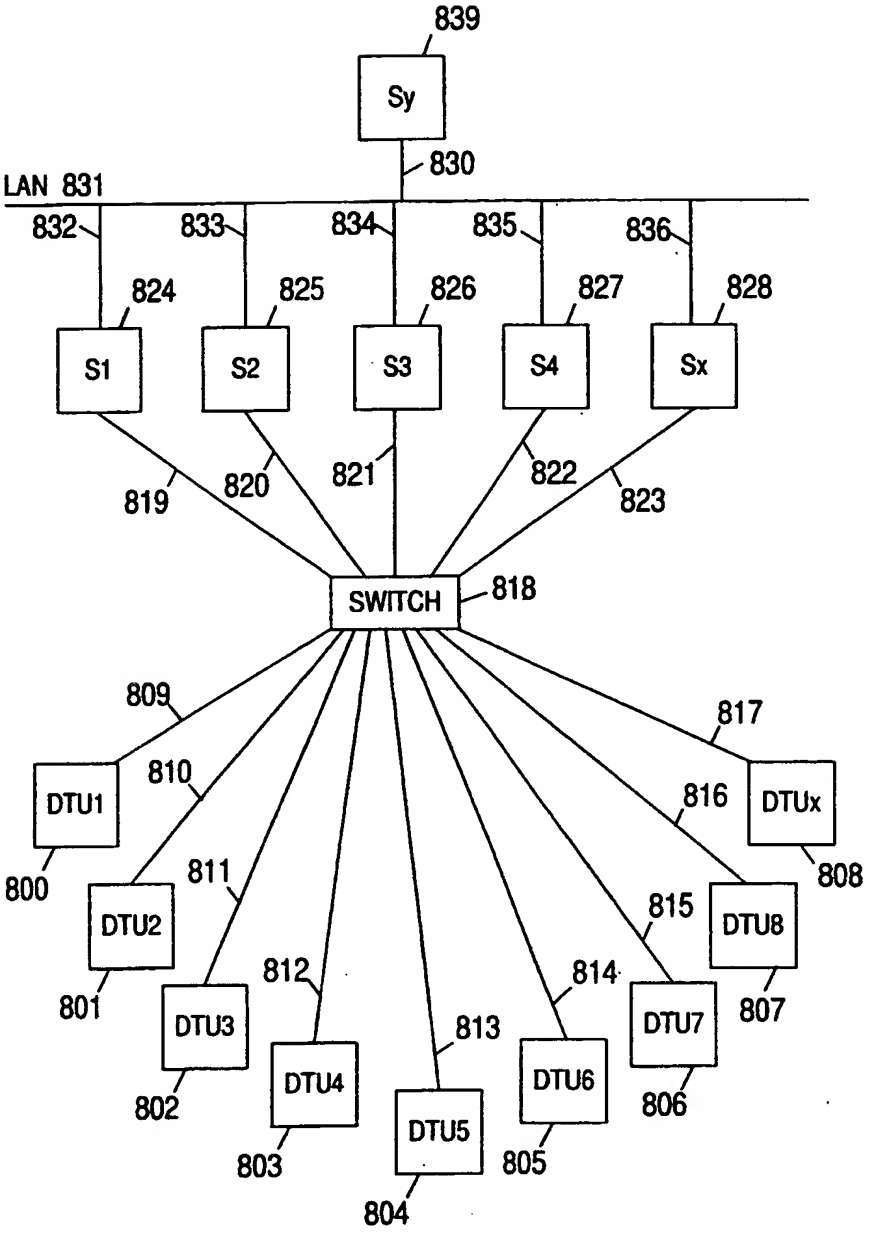
839
Sy
830
LAN 831
832
833
834
835
836
824
825
826
827
828
S1
S2
S3
S4
Sx
819
820
821
822
823
SWITCH
818
809
810
811
812
813
814
815
816
817
DTU1
DTU2
DTU3
DTU4
DTU5
DTU6
DTU7
DTU8
DTUx
800
801
802
803
804
805
806
807
808

FIGURE 8

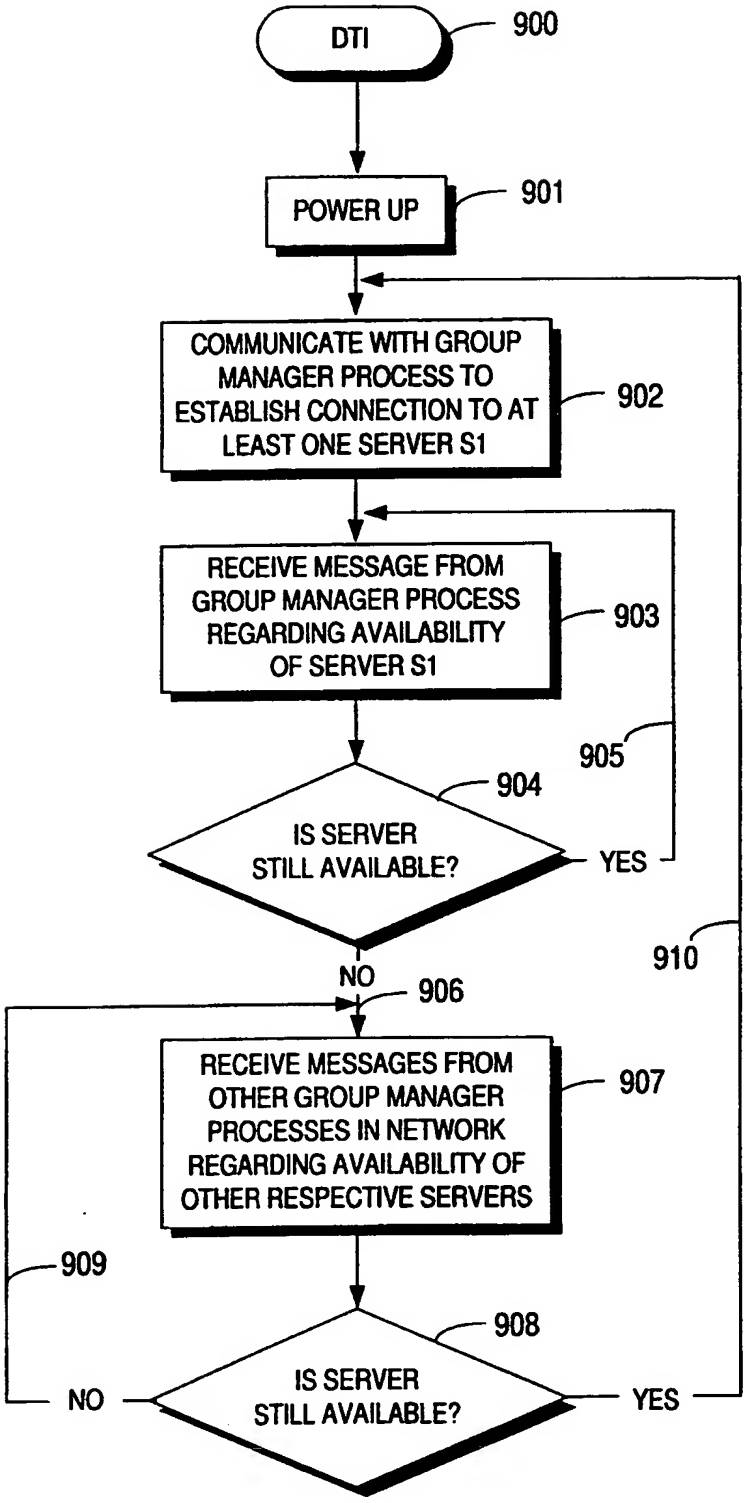
DTI
900
POWER UP
901
COMMUNICATE WITH GROUP MANAGER PROCESS TO ESTABLISH CONNECTION TO AT LEAST ONE SERVER S1
902
RECEIVE MESSAGE FROM GROUP MANAGER PROCESS REGARDING AVAILABILITY OF SERVER S1
903
905
IS SERVER STILL AVAILABLE?
904
YES
NO
910
906
RECEIVE MESSAGES FROM OTHER GROUP MANAGER PROCESSES IN NETWORK REGARDING AVAILABILITY OF OTHER RESPECTIVE SERVERS
907
909
IS SERVER STILL AVAILABLE?
908
NO
YES

FIGURE 9A

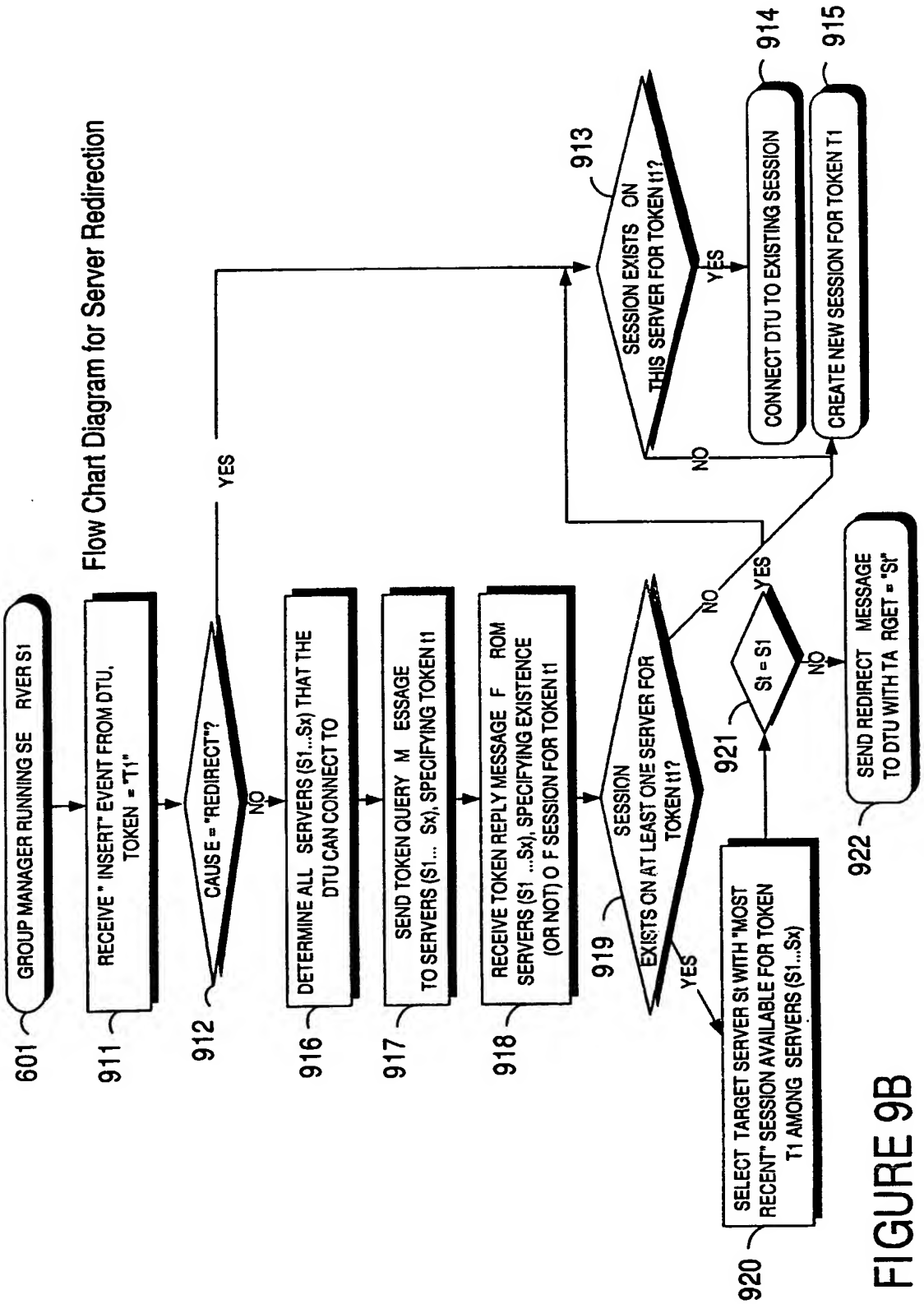
Flow Chart Diagram for Server Redirection
601
GROUP MANAGER RUNNING SE RVER S1
911
RECEIVE " INSERT" EVENT FROM DTU, TOKEN = "T1"
912
CAUS E = "REDIRECT"?
YES
NO
916
DETERMINE ALL SERVERS (S1...Sx) THAT THE DTU CAN CONNECT TO
917
SEND TOKEN QUERY M ESSAGE TO SERVERS (S1... Sx), SPECIFYING TOKEN t1
918
RECEIVE TOKEN REPLY MESSAGE F ROM SERVERS (S1 ...Sx), SPECIFYING EXISTENCE (OR NOT) O F SESSION FOR TOKEN t1
919
SESSION EXISTS ON AT LEAST ONE SERVER FOR TOKEN t1?
YES
NO
913
SESSION EXISTS ON THIS SERVER FOR TOKEN t1?
YES
NO
914
CONNECT DTU TO EXISTING SESSION
915
CREATE NEW SESSION FOR TOKEN T1
921
St = S1
YES
NO
920
SELECT TARGET SERVER St WITH "MOST RECENT" SESSION AVAILABLE FOR TOKEN T1 AMONG SERVERS (S1...Sx)
922
SEND REDIRECT MESSAGE TO DTU WITH TA RGET = "St"

FIGURE 9B

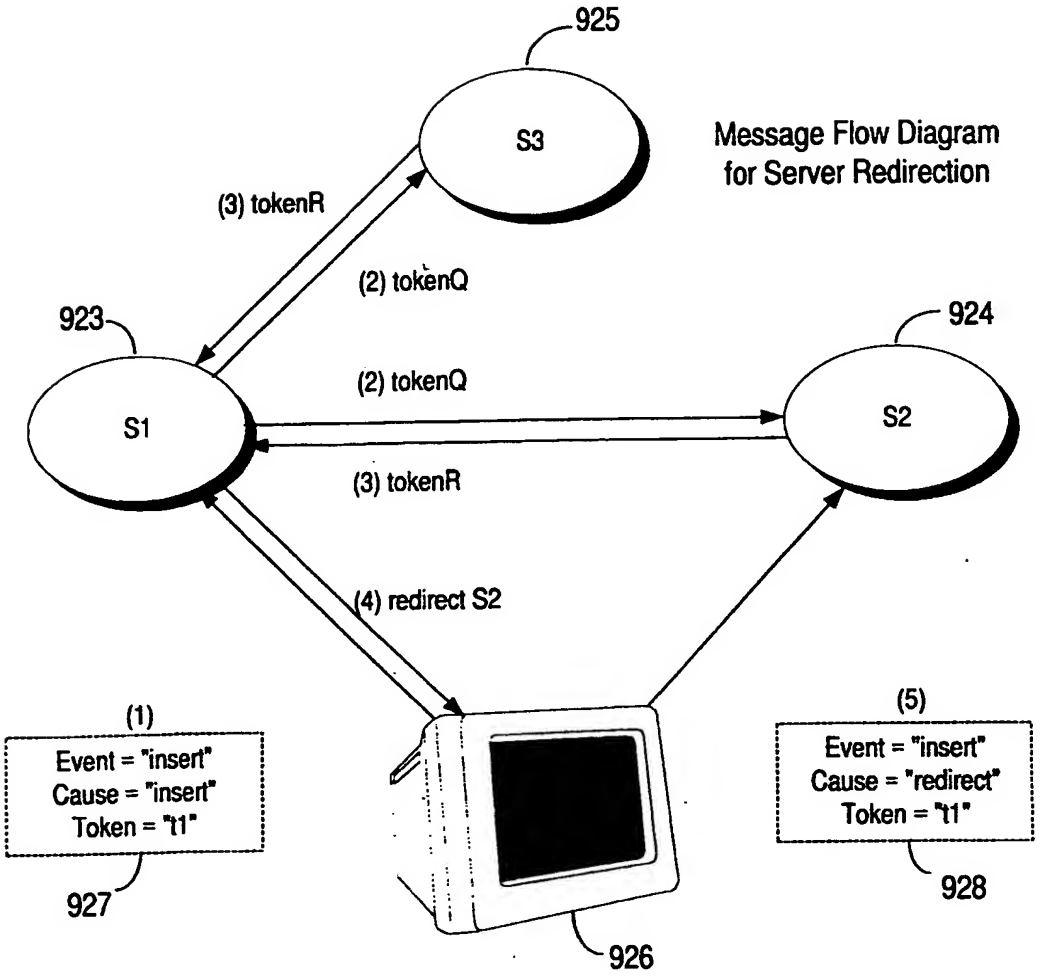
925
S3
Message Flow Diagram
for Server Redirection
(3) tokenR
(2) tokenQ
923
924
(2) tokenQ
S1
S2
(3) tokenR
(4) redirect S2
(1)
Event = "insert"
Cause = "insert"
Token = "t1"
927
(5)
Event = "insert"
Cause = "redirect"
Token = "t1"
928
926

FIGURE 9C

10/811,327 PPU-892

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< Back t

Operation record based work events grouping method for personalinformatio management system

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Dept. of Comput. Sci. & Electron., Kyushu Inst. of Technol., Fukuoka;

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Operation Record based Work Events Grouping Method for Personal Information Management System

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Abstract

In order to improve the efficiency of any business, it is now very important to reuse knowledge by accumulating it in a computer. We propose a method that accumulates and reuses knowledge of work by automatically extracting it from a user's operation records during ordinary use on a Personal Information Management system (PIM). We assume that related work events on the PIM are input and referred to consecutively by the user. Our method that extracts available knowledge constructs a workflow by grouping all related events and detecting milestones based on the time and order of operating target events. Usually, reference to events is the user's viewing of events on the calendar without involving operations, so recording a target event and time of reference is difficult. In order to record the user's reference behavior exactly, we introduce a balloon-help-based function for event reference support.

1. Introduction

It has become important that we manage workflow [1,2] in order to improve the process of a work project in today's enterprises. This paper proposes a method that automatically extracts a workflow as "knowledge of work" by grouping related work events from a user's operation record on a PIM.

Workers can perform various work projects successfully by grasping knowledge of work including the details, timing, material resources, and potential pitfalls. Because workers often perform the same type of work project, they can reuse knowledge of work done previously in order to do jobs better and faster.

If inexperienced workers could reuse knowledge of work that the experienced co-workers have, the inexperienced workers could also perform the work projects well and on time. To make this knowledge of work available for reuse, we must record it in some way. There are some systems [3] that share and reuse knowledge by accumulating it in a computer. However, the difficulty and cost of representing and inputting knowledge are often prohibitive.

For individual schedule management, many people now use a PIM [4,5] on a computer. We need much knowledge of work in planning of scrupulous schedules that can be performed successfully. We input the tasks (that are called "events") of our work project and update them in progress on a PIM. The schedules reflecting the sum of these inputs and modifications constitute true knowledge of work. Schedules for a work project consist of some detailed events and the relations between events such as the order and timing of these events. Therefore, we consider that schedules for a work project present a "workflow" in a PIM. But an ordinary PIM only records separately the individual events placed on the calendar. It cannot manage relations between events that work events essentially have, and we cannot reuse all of related work events as a lump workflow.

Therefore, an ideal PIM has to grasp relations between events and manage schedules as a workflow, including all necessary events related to a work project and the order of the events. From this viewpoint, we have been researching and developing a system [6,7] that shares and reuses knowledge of work by accumulating schedules systematically based on relations between events. Furthermore, we suggest refining schedules during repeated reuse.

On project management systems [8,9] that manage relations between events for a work project, a manager lists all of the events needed for a work project in advance with scrupulous care and inputs their relations while registering them. In western countries, a work project is planned and performed in a top-down style where the manager decides the outline of a work project and delegates detailed tasks to his workers. In this style, a project management system is

suitable. However in Japan, a work project is planned and performed using a bottom-up style where negotiations take place among the workers and the sum of their detailed tasks decides the schedules of the work project. In this style, because the project management system is not suitable, a manager cannot use it. Typically, in Japanese enterprises each worker uses a PIM instead. Therefore, we propose a PIM that can automatically group related work events and organize a workflow by extracting relations between events as the user interacts with the PIM in the course of daily work.

As a method extracting relations between events, we had considered a method that uses proximity of event execution dates. However, the method erroneously groups events of some unrelated works because users input events of some unrelated works that the user should do separately but in parallel. The system needs a function to selectively group events only related to a work project based on the true relations between those events.

We had also considered a method that uses similarities of words contained within events. The method groups related work events based on similarities between events extracted from the text contained within individual events on a PIM. We studied techniques [10,11] that calculate the similarities between words in each sentence in order to find similar sentences in natural language processing systems. However, the resemblance between events based on text examination alone did not match well the actual relations between events on schedule. It is difficult to pick out relations between events only using this method.

The user of a PIM who inputs events understands well the relations between these events. We believe that he signals relations between events in the way he uses the PIM. In this paper, we propose a method that automatically construct a workflow by grouping related work events and detecting milestones from a user's actions on the PIM. The PIM has to record these actions in order to analyze them. We introduce a method that records using a balloon-help function, which is a natural method for users, and excellent for our purpose. We have developed a prototype PIM and tested it in some actual organizations. We confirmed that our method recorded many references to events, and could make groups of related work events with accurate probabilities by analyzing the user's operation records. Furthermore, we found that our method could detect milestones based on relations between events and construct a workflow.

2. Schedules as a workflow

2.1. Schedules on a PIM

As shown in Fig.1, a PIM user makes schedules by inputting events in the appropriate frame on the calendar, and will refer to the events on the calendar in order to carry out work projects according to the schedule.

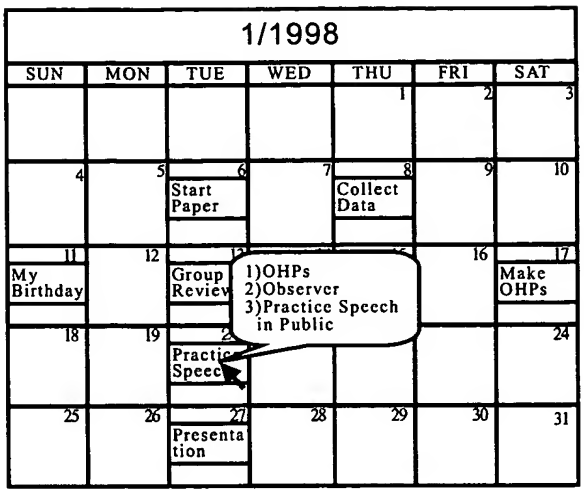
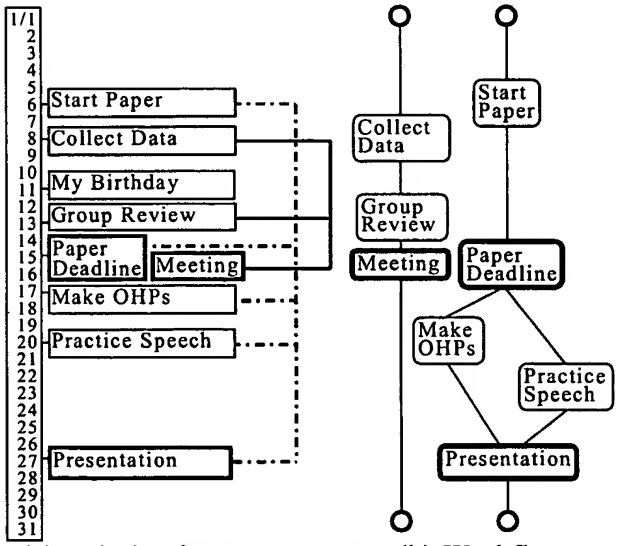


Figure 1. Calendar on a PIM.

We present a time-sequential series of events (Fig.2) to explain the relation between events. As shown Fig.1 and the lined up boxes of their events in Fig.2(a), an ordinary PIM just shows the individual events and doesn't manage the relations between events. Therefore it is impossible to grasp the relation between events unless a user produces the schedule, and especially if a user is an inexperienced worker. In spite of inputting the information of events in a computer, there still exists the problem that we cannot reuse that information as one "knowledge of work" which includes the relation between events.



(a) Relation between events (b) Workflows

Figure 2. Relation between events and workflow.

2.2. Workflow on a PIM

An experienced worker who uses the PIM imagines the relations between events shown as connecting lines and identifies critical points shown as bold boxes in Fig.2(a), thus the worker use the information of the PIM as knowledge of work. Critical points are primary events in both planning and executing schedules, and are called "milestones". Milestones determine the order of the events that precede and follow. The ideal PIM should discern the user's understanding of relations and milestones to produce a workflow PERT diagram [12] like that of Fig.2(b) and manage them as one lump. The PIM should also return the workflow so that the user can perform the work project more efficiently by using it.

2.3. Structure of a "workflow" in a PIM

In order to manage relations between events in a PIM, we introduce a structure that is called a "workflow" in a PIM as shown in Fig.3. A workflow is composed of some events and relations between these events. In Fig.3, the white boxes show events and the connecting bold line between the boxes shows the relation between events.

Each event has fundamental information such as title, start date, end date, period, or time and so on. The bold boxes are milestones. In our PIM, further, each event can have information as to whether it is a milestone or not and whether a relation between events has a restriction. For example, one event has to end before another event has started.

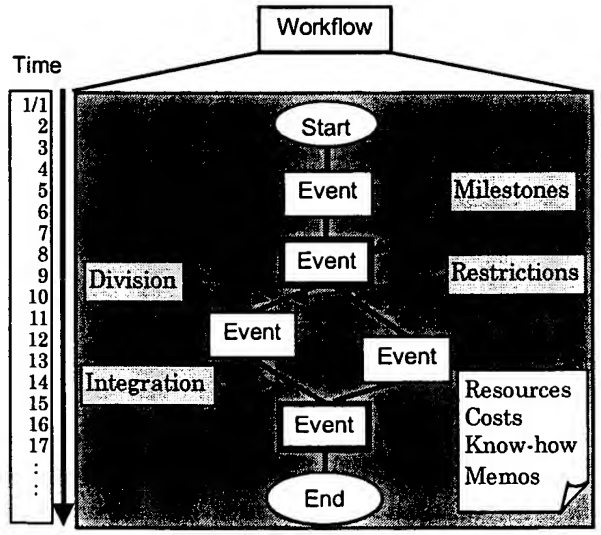


Figure 3. Structure of a workflow.

A workflow covers all events needed for doing a work project and all relations among those events. Therefore, it is very important in terms of representing relations between events in a work project as knowledge of work. Furthermore, we can attach associated information to a workflow, such as resources, costs and noteworthy points, and manage a workflow and them together. It becomes possible to transfer, delete, or reuse a workflow as one "knowledge of work".

3. Proposal system

Fig.4 illustrates our ideal system. We propose a PIM that automatically obtain knowledge of work in the user's mind and accumulates it as a workflow by using a database.

3.1. Reuse of accumulated schedules

In our ideal PIM, the users can pick out a workflow of a similar work project previously done and reuse its fundamental schedules from a database. These schedules include almost the necessary knowledge of work because we do the similar tasks repeatedly. We list merits of reuse below.

- The users don't need to make schedules for a similar work project again.
- There is no omission of necessary events for a work project in schedules accumulated in a database.
- The users can keep resources needed for a work project securely.
- The users can accumulate know-how based on their experiences.

Experienced and inexperienced workers can make schedules that can do jobs better and faster by reusing workflows.

3.2. Refinement of accumulated schedules

The users modifies the fundamental schedules in order to adapt them for their current work project and then performs the tasks therein. When the schedules don't go well, the user modifies the schedules again. The sum of these modifications is true knowledge of work because the user experiences the work project in reality. So our ideal PIM improves the workflow of the fundamental schedules in the database based on those modifications. We call this mechanism "refinement". In our system, the schedules become available as they are reused. We list the advantages of refinement below.

- It improves knowledge of work in quality and quantity.
- It adapts knowledge of work to changes in surroundings of a work project.

For example, if the duration of some event in a work project changes, the mechanism of refinement can automatically adapt accumulated schedules to the change by revising their durations based on an analysis of the user's modifications to the events.

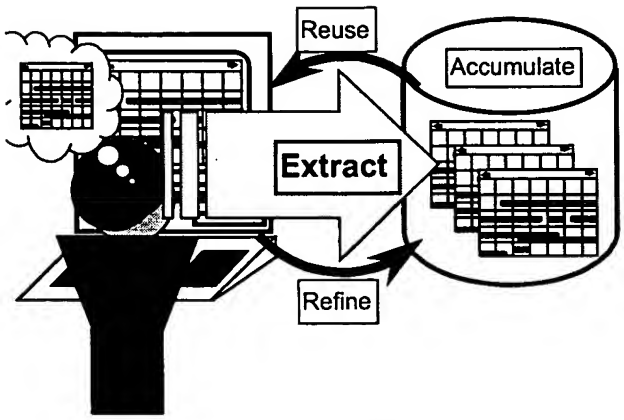


Figure 4. Proposal system.

However, if accumulated schedules are too few or poor in quality, users won't reuse those schedules. So the schedules won't be refined over multiple uses. It is important that our system extracts schedules without errors or insufficiency of knowledge of work. Therefore, in this paper we suggest a key method that automatically grasp knowledge of work from the user's mind during the ordinary use.

3.3. Extraction from user's actions

It is very difficult to automatically acquire the knowledge that a person has in his or her mind. However, we can observe his or her behavior during the use of a PIM. During confirmation of event schedules, actions such as a change of eye point or instructions by mouse are performed based on his knowledge of the work. Therefore, by observing and analyzing these actions, it is possible to grasp the knowledge of work that he has in mind.

4. Recording user's actions

4.1. Problem

The user's operations on a PIM are classified into registrations of, and references to, events. A user registers events by operating a computer directly, such as clicking the mouse or striking keys. Therefore, it's easy for the system to record [13] and analyze these actions. On the other hand, the user often refers to events just by looking at them on a calendar view of the PIM not involving input devices.

The registration of an event is done just once for each event, but references to an event are made more frequently while a user carries out a work project. It is very important for analyses of the user's behavior that the PIM records many instances of user reference activity.

As a method for recording the user's references, we might use an eye tracking [14] system. However, it is impractical in terms of bulkiness and the cost of the equipment for an ordinary office-use system. The method has to be simple and efficient, when we consider using it in an ordinary office.

4.2. Balloon-help function

The requirements for a method that records a user's operations are shown below.

(1) The system can correctly record which event and what time the user references.
(2) The system is simple and inexpensive.
(3) The system is felt to be natural by the user.
(4) The system leads the user to spontaneously indicate target events.

For a recording method to meet these demands, we introduce a method that uses a Balloon-help [15,16] function as shown in Fig.1. For detailed information we can record the necessary resources and noteworthy points in the event. The user spontaneously moves the mouse to his target event. A balloon-help function indicates a temporary dialog for details of the event and makes it easier for us confirm the information of the event, we move a mouse to the event which the user is interested in, and point it out. Using this method, the system grasps the user's actions of references to events through mouse operations and records them.

5. Constructing workflow

Our method records and analyses the user's operations, and constructs a workflow by extracting relations between events. Our two processes of constructing a workflow are:

- Grouping related work events.
- Detecting milestones.

As shown in Fig.3, our method lines up the grouped related work events according to their execution dates. When some events are executed over the same period, our method divides those events into some subprojects in parallel. Our method makes connections from each detected milestone to preceding and following events. Subprojects are then integrated into an event of another milestone. Thus, our method constructs a workflow.

5.1. Operation record based work events grouping method

5.1.1. Grouping based on registration time

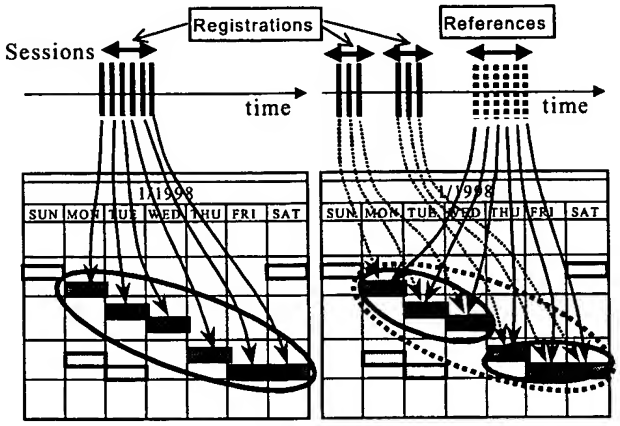
When the user registers events, there are two techniques of registration.

- Top-down registration
- Bottom-up registration

We explain a method for grouping events based on the registration time of events. Fig.5 shows a time chart when a user registers and refers to events.

When a user registers events based on the top-down

technique, a system can easily group related work events by grouping all of the events registered in a same session, because these registration times are close to each other (as a solid circles shown in Fig.5(a)). On the other hand, when a user registers events based on the bottom-up technique, a system cannot group related work events precisely because the registration times aren't close to each other, and a system might group them separately (as two small solid circles shown in Fig.5(b)).



(a) Top-down (b) Bottom-up

Figure 5. Grouping events based on registration time and reference.

5.1.2. Grouping based on reference time

In an ordinary PIM, the users register events using a bottom-up registration technique because the user registers them sporadically as they hits upon necessary events in progress. Therefore, in order to extract knowledge of work during their use of the PIM, the system needs a function to group events that the users register based on the bottom-up registration technique. In most cases, users refer to events of the same work project in the same session. Therefore, we invented a method to group related work events based on reference time to them.

In the example of Fig.5(b), while obtaining records of reference time shown as dotted vertical bar, the system can combine the two groups into one correct group of the same work project (shown as a big dotted circle) by grouping them based on records of reference time, because the events in these two groups are referenced in the same session.

5.2. Detection of milestones based on records of reference

The system also can detect Milestones by analyzing records of reference. When an event is a milestone, the event would have the following characteristics:

- It represents a deadline or a checkpoint.
- It determines when preceding events must be finished or following events started.

Therefore, the event would be repeatedly referenced consecutive to preceding and following events. The system can automatically detect milestones by picking out such records of reference. Furthermore, our method decides each restriction between the detected milestone and the events that should precede and follow. For example, as shown in Fig.2(b), "Make OHPs" and "Practice speech" have to start after "paper deadline" of one milestone and finish by "presentation" of another milestone.

6. Evaluation

We made a prototype PIM (Fig.6) and ran a trial with 5 workers and 10 students who used our prototype PIM in order to confirm the efficiency of our method, The PIM recorded their operations for a one-month trial period.

The users could register, change, and refer to events on the calendar view (shown in Fig.6). The users could record and refer to the information such as necessary resources and noteworthy points for an event using a detailed window for information of an event. Alternatively, users could refer to the same information using our balloon-help function (as a solid circle shown in Fig.6). Our system recorded the target events and operation times for five operations in compiling the user's records: registrations, deletions, changes, references by detailed window, and references by balloon help.

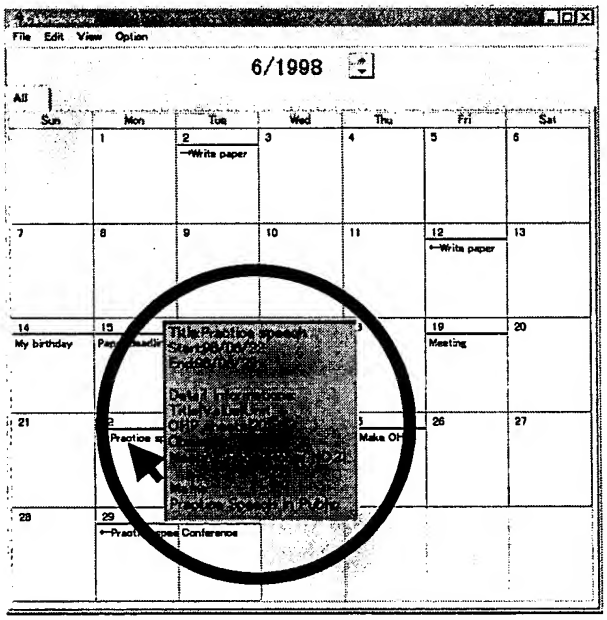


Figure 6. Calendar view of the prototype PIM.

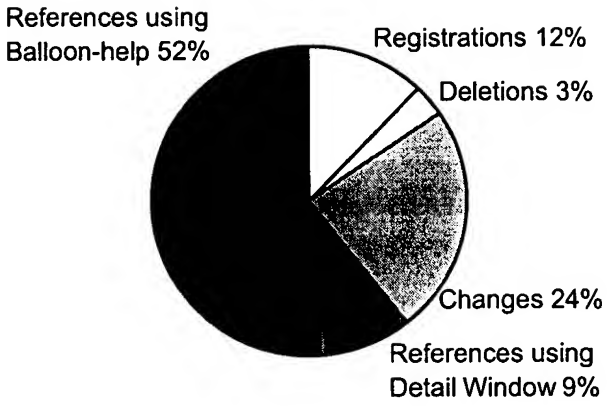


Figure 7. Incidence of operations by the users.

6.1. Confirming our assumptions for users' actions

As we present the results of our test evaluation, our assumptions concerning users' behavior are outlined as confirmed by our analysis of the users' operation records.

- The users refer to events using not the detail window but balloon-help.
- The users frequently refer to an event in progress while carrying out a work project.

6.1.1. Balloon-help efficiency

Fig.7 shows each incident of the five operations. The users' references by balloon-help were recorded about 6 times more frequently than references using the detail window. We may assume that the users didn't refer to events using the detail window, as it needs two strokes to open and close the window, and would instead refer to events by just looking at the calendar view. In the case of our prototype PIM, due to its simplicity, users' were encouraged to employ the balloon-help function. We confirmed that our system efficiently recorded the users' reference actions using our balloon-help function.

6.1.2. Many records of users' reference operations

As shown in Fig.7, we also found that the sum of reference and change operations was 85 percent of the total; about 7 times more frequent than the users' registration of events (12 percent of the total). We concluded that the users frequently referred to events that they registered while performing the work project in progress.

Our prototype PIM could record the users' reference actions as mouse operations for balloon-help functions and could analyzed many of the users' reference operations.

6.2. Extracting operations in same session

Our method makes groups of related work events based on a user's operation records in the same session. Therefore, we have to extract only operations in the same session from all of the user's operations records. During this trial, for all users, we regarded operations as being in the same session when the interval between the user's operations was less than two minutes. We adopted this value for the interval because it illustrated in the best correspondence of the groups of truly related work events as the user has intended.

6.3. Result of grouping based on registration time

Fig.8 shows the results of our method of grouping events based on registration time against the records of all users' operations. The horizontal axis shows the number of events placed in each group by our method. The left-side bars in Fig.8 show the ratio of groupings for each number of events in a group. The groups with one and two events accounted for 39 and 22 percent of all groupings respectively. Their sum is high, about 61 percent of total groups. This result shows that many of the users' registration operations were input sporadically using bottom-up registration.

The right-side bars in Fig.8 show the ratio at which our method correctly grouped related work events (as users stated in post-trial interviews). As shown in Fig.8, our method couldn't make correct groupings about 70 percent of the time. We confirmed that some events couldn't be correctly grouped with truly related work events whenever the users registered events based on the bottom-up technique.

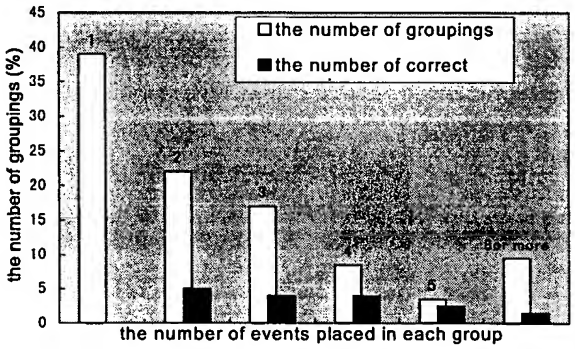


Figure 8. Ratio of correct to all groups based on registration time.

6.4. Result of grouping based on reference time

Fig.9 shows the results of our method of grouping events based on reference time. The left-side bars in Fig.9 show the ratio of groupings for each number of events in a group. The center bars in Fig.9 show the ratio at which our method grouped correctly the related work events as users intended. The sum of the center bars is 67 percent of the total groups. This result shows that most of the users referred the events related to the same work project in the same session. We'll explain the right-side bars at 6.4.2.

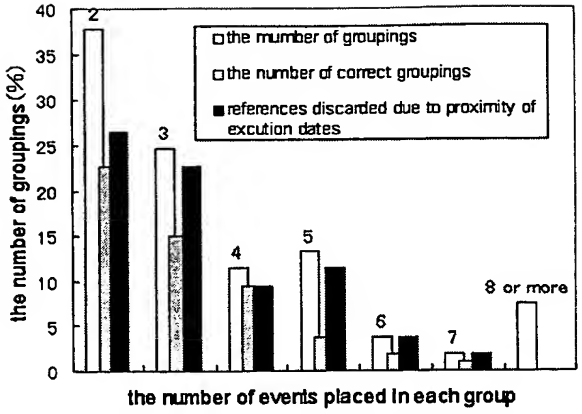


Figure 9. Ratio of correct to all groups based on reference time.

6.4.1. Example of grouping based on reference Time

In Fig.10, each event is placed on the vertical axis, and the horizontal axis shows the user's operation time on the events. The three groups (Group1, 2, 3) were extracted using our method for grouping events based on registration time. The events in Group1 registered based on the top-down technique were grouped correctly. But, he events in both Group2 and Group3 were grouped separately because their registration times weren't in the same session, despite their true relation to the same work project.

On the other hand, as shown a dotted circle, the events in both Group2 and Group3 are referred to in the same session. Therefore, we confirmed that our method could combine the two groups into one correct group of the same work project using our method for grouping events based on reference time as shown with a solid bold circle.

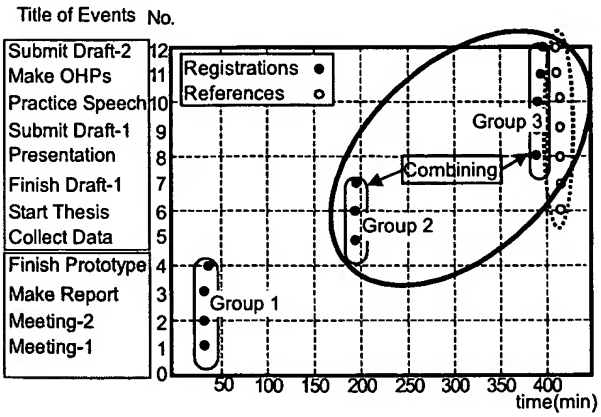


Figure 10. Combining groups based on reference records.

6.4.2. Improvement of grouping probability

In Fig.11, the two dotted frames show that the user referred to the events related to the same work project in the same session. But the solid frame shows that he referred to the events unrelated to the same work project in the same session. From interview to the user, we confirmed that he might have mixed up his references to the events of unrelated works to manage his schedule, because of the near dates of these events executed.

Therefore, when the execution dates of events are near each other, our method gives less weight to the user's frequency of reference operations in the same session, because those events might not relate to the same work project.

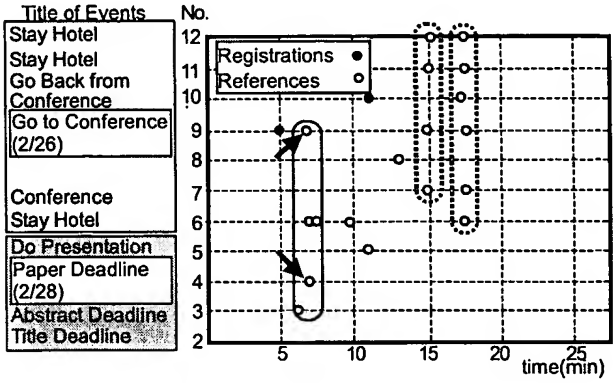


Figure 11. Reference to events near in time.

The right-side bars in Fig.9 show the results we compiled mechanically, leaving out those events referenced in the same session because the interval of those events' execution dates were less than 2 days (as the solid frame of Fig.11). In this case, the ratio of correct to the total groupings was high at about 80 percent. It appears that we may improve grouping probability with our method by adjusting weight to the user's frequency of reference operations.

Therefore, we consider that it is possible to group related work events correctly, using our method for grouping events based on many records of the user's reference operations, because users almost always refer to the events related to the same work events in the same session.

6.5. Result of detection milestones

In Fig.12, three events (No.1, 6, 8) were repeatedly referenced in the same session by the user. Further, we analyzed the records of the references, and we found that the event No.1 was alternately referenced consecutive to the events No.6 or No.8 as shown by the arrows in Fig.12. Therefore, we confirmed that event No.1 was a milestone to the preceding events No.6 and No.8.

We found that events of No.6 (2/6~2/20) and No.8 (2/11~2/20) should be performed and finished in parallel, and put together into the milestone of No.1 (2/21). Thus, our method could obtain the restrictions of execution dates of events, and organize all events needed for a work project as a workflow. Therefore, users would be able to reuse these schedules as knowledge of work.

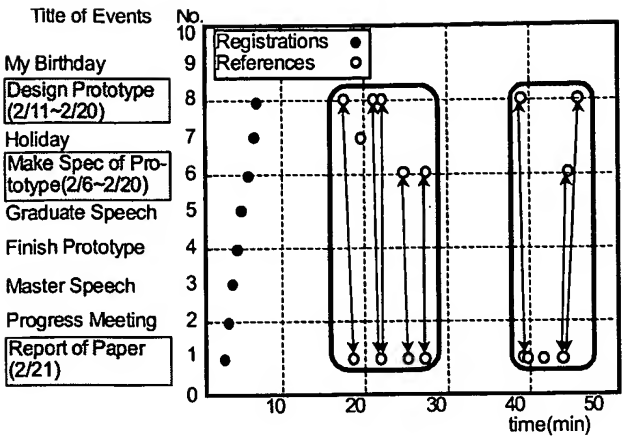


Figure 12. Extracting milestone based on reference records.

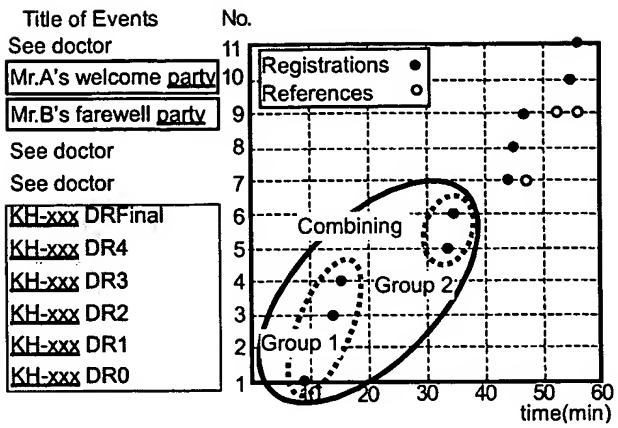


Figure 13. Grouping events based on Similarities between events.

6.6. Similarities of text contained within events

Fig.13 shows examples of grouping events based on similarities of words contained within the events. In Fig.13, Group1 and Group 2 were grouped separately based on registration time. In this case, the titles of the events in the two groups include same words "KH-xxx" which is the proper name of product. Therefore, we combined two error groups into a correct group (shown as a bold circle) based on similarities between events.

On the other hand, the events "Mr.A's welcome party" and "Mr.B's farewell party" both included "party" which is general noun, even though the two events are not related in a work project. We cannot correctly group events based on simple word similarities between events.

We saw in these results that correctly grouped events included the same proper noun and that incorrectly grouped events often included the same general noun. Therefore, we are considering a sub method to support improvement of our grouping probability in cases where several events include the same proper noun.

7. Conclusions and future works

In this paper, we proposed a simple and efficient method for recording users' reference operations using a balloon-help-based function. We also proposed a method that automatically organizes all related work events into groups, detects milestones, and constructs workflows.

Furthermore, we developed a prototype PIM and ran a trial to record the users' operations, then analyzed the users' actions and confirmed the efficiency of our method.

Based on the results of this analysis, we will re-design our method to extract workflows, and clarify the mechanism of our system to accumulate, share, and reuse workflows efficiently.

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